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VIEWS

Editor



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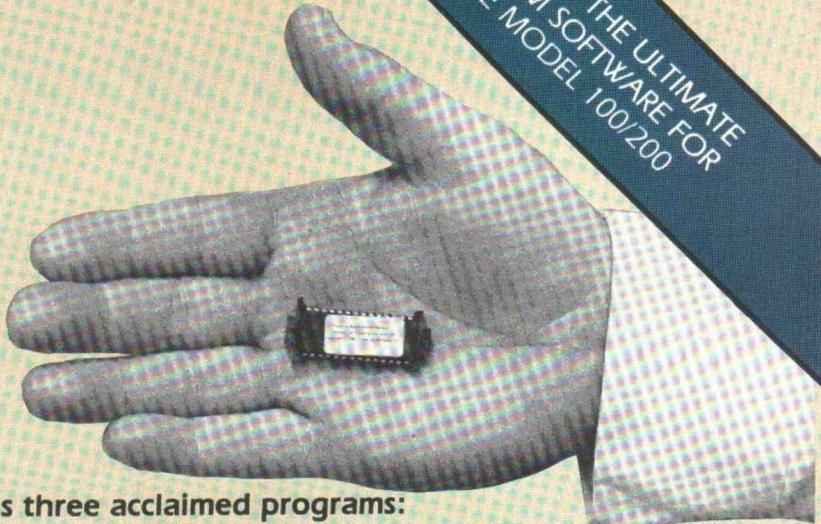
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SEPTEMBER 1985

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6 ROM BANK

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The ROM bank props up the Model 100 at the same angle and height as those little legs you've seen. The ROM BANK itself is only about 1 1/2" deep and it runs the width of your Model 100. It only weighs one pound. It not only installs instantly, but it pops free in a second if you need everything to lie flat in a briefcase.

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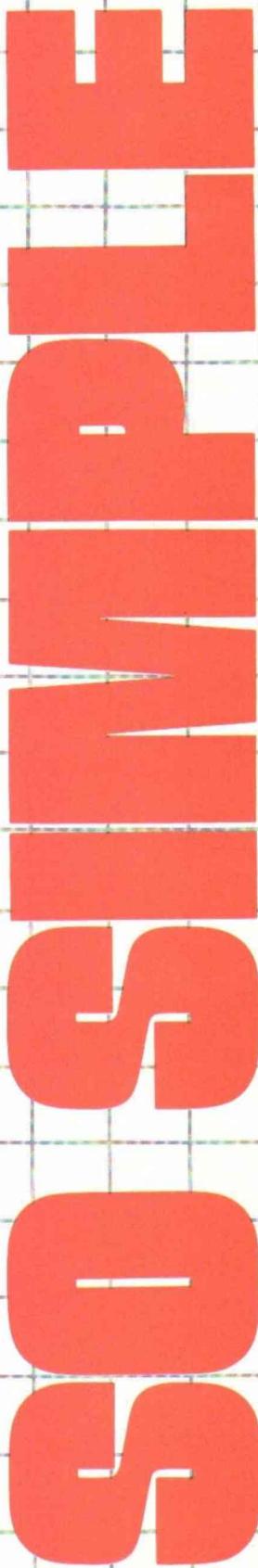
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100/200

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FROM WITH A VIEW

A BIRTHDAY TOAST TO THE FUTURE

The rapid evolution and domestication of computer technology and software programs are bringing to more and more people ever-easier access to new and powerful tools that can enrich our daily living and enhance our opportunities for personal creativity and communication.

— Joel S. Birnbaum

Another birthday. But contrary to the way most of us over 30 view the auspicious day each of us joined the Race, this birthday is cause for celebration. Pat yourselves on the back. Portable 100/200 is commencing its third year of publication and you readers can be proud.

You made a smart choice when you picked the Model 100 and/or Tandy 200. The Tandy portables are two of the most ingenious machines in the world. Instead of homing in on one specialized field such as business applications, the Tandys continue to expand and keep up.

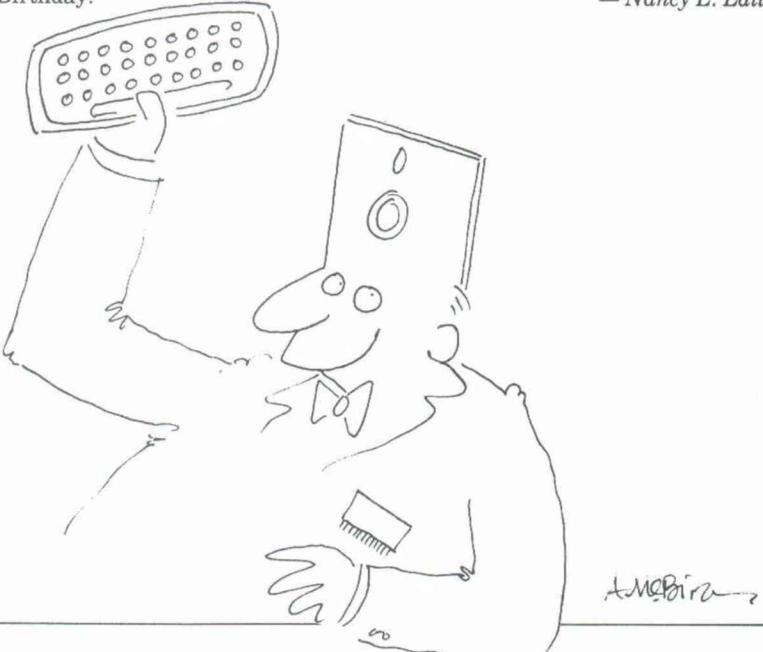
Controlling the world is here: in the home, in the field, in space shuttles like the Challenger's first mission last October.

An integral part of this global powerplay is the Model 100 and digital technology — incorporating digital code, the series of ones and zeros used by computers. Coupled with analog-to-digital converting units (ADCs), laptops can provide *real-world* data anywhere. This month we take a look at this brave new world of laptop power.

It would appear we are definitely cohabiting with computers. Today there are more computers than people in the United States. Joel Birnbaum of Hewlett-Packard's Computer Research Center says, "American society has progressed to the point where some citizens will own more computing power than the amount projected 30 years ago as the national requirement."

The Tandy portables are a part of this runaway technology. How can a laptop owner go wrong? With the machines' built-in modem, serial port, BASIC and display screen, the universe is the limit. What a fortuitous note on which to sing Happy Birthday.

— Nancy L. Laite



A BASIC COMPARISON

The BASIC language interpreters found in the TRS-80 Model 100 and the NEC PC-8201A are very similar. Both were implemented by Microsoft of Seattle, Washington. The differences are due to hardware variations. The 100 has a built-in modem which the NEC lacks. However, the NEC has more logical function keys, more main menu functions and supports three memory banks of 32 kilobytes (K) each.

The table compares the two portables, illustrating alphabetically keywords, commands and functions unique to each machine.

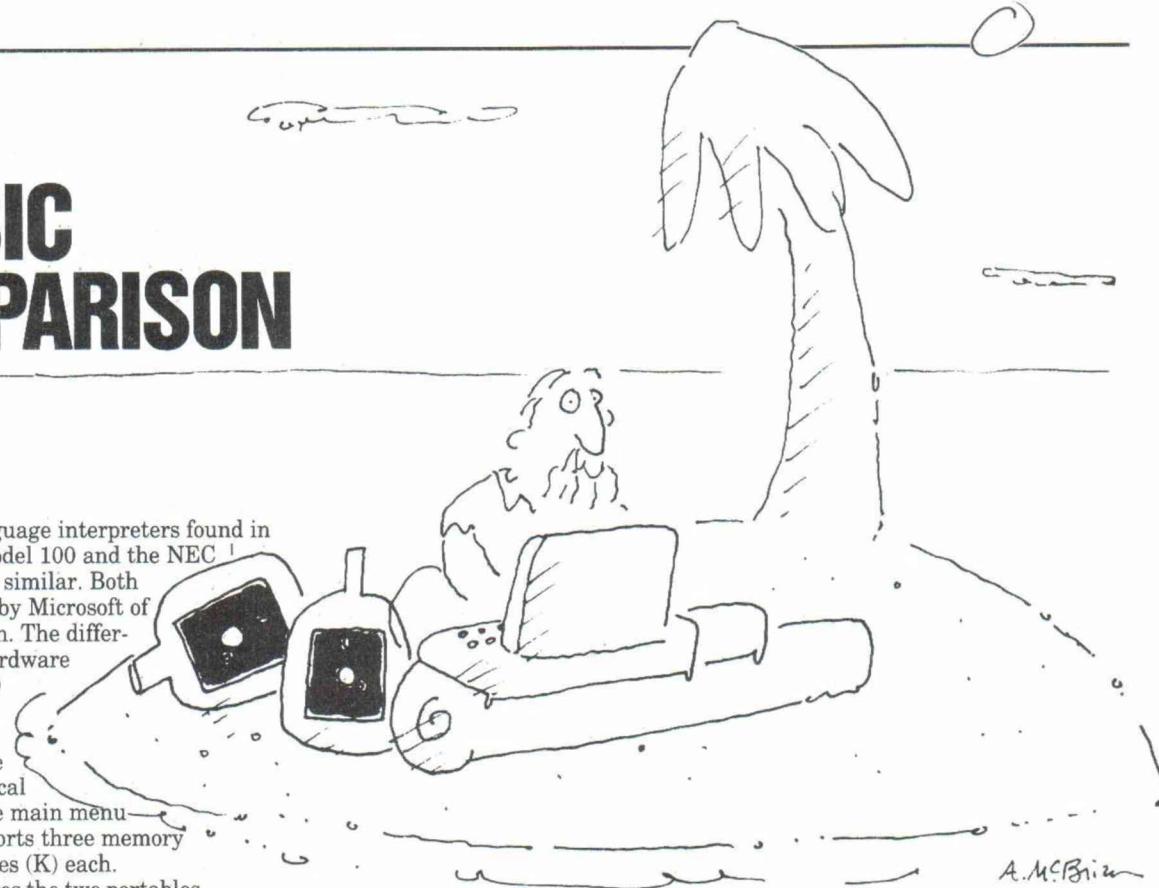
CALL. vs .EXEC - The 100 has the call command: `CALL <adr>, <A-value>, <HL-value>` which is used to begin execution of an assembly-language program located at `<adr>` in memory. An 8-bit value can be put into the A register and a 16-bit value in the HL registers for use by the program being called.

The NEC has the equivalent command: `EXEC <adr>` for calling an assembly-language program located at `<adr>`. The A and HL registers aren't set as part of the call command, however. They can be set via `POKE` using reserved addresses in the system area (63911 for A reg., 63912 for L, and 63913 for H). `PEEK` can be used to read the registers upon returning from the subroutine.

PRINT. vs .PRINT - The NEC `PRINT USING` command doesn't support the `! , n-spaces <ROM>, $$`, or the `**$$` print format controls. The Model 100 does.

The 100 lets users position the cursor and print with one command such as `PRINT @ X,Y <list>`. The NEC can do the same thing, but requires two BASIC commands, namely, `LOCATE X,Y : PRINT <list>`. —

Larry Berg
Purple Computing



A. McBride

BASIC Dialects

Function	Machine	Other machine's equivalent function
BLOAD	NEC	LOADM - Identical function & parameters
BLOAD?	NEC	LOADM? - "
BSAVE	NEC	SAVEM - "
CALL	M100	EXEC - see CALL-vs.EXEC below
CLOADM	M100	BSAVE "CAS: ..."
CSAVEM	M100	BLOAD "CAS: ..."
DAY\$	M100	**NONE**
EQV	NEC	**NONE** - same as "NOT (A XOR B)"
HIMEM	M100	**NONE**
IMP	NEC	**NONE** - same as "NOT (A OR B)"
IPL	M100	Same function, but accessed from Main Menu.
KEY LIST	M100	**NONE**
KEY ON/OFF	M100	**NONE**
LCOPY	M100	**NONE**
LINE	M100	**NONE**
LOADM	M100	BLOAD
LOADM?	M100	BLOAD?
LOCATE	NEC	**NONE** - PRINT @ has similar function
MAXRAM	M100	**NONE**
MDM ON/OFF	M100	**NONE**
MOD	NEC	**NONE** - same as "A - INT(A/B) * B"
ON KEY GOSUB	M100	**NONE**
ON MDM GOSUB	M100	**NONE**
ON TIME\$ "	M100	**NONE**
PRINT**	M100	NOT ALL FEATURES - see PRINT-vs.PRINT
RENUM	NEC	**NONE**
RUNM	M100	BLOAD ... : RUN
SAVEM	M100	BSAVE
SOUND ON/OFF	M100	**NONE**
TIME\$ ON/OFF	M100	**NONE**
VARPTR	M100	**NONE**

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MEN-U-UTILITY

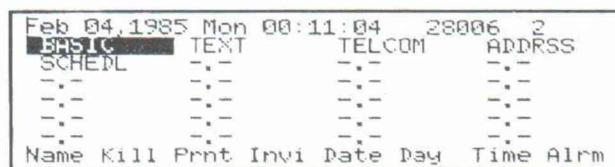
Men-u-utility is a powerful new utility for your Model 100. Once installed it is completely automatic and comes up when ever you would normally return to the main menu. As you move the cursor bar over the files, the length of each file is instantly displayed in the upper right corner. Men-u-utility adds 8 function keys to your main menu. You can kill files, rename files, make files invisible, set the day, date and time without ever leaving the menu.

Men-u-utility is also a print formatter. With F3, you can print any .DO file to your printer and you decide the right and left margins, top and bottom margins and page length! F8 sets an alarm that will go off no matter what mode you are in, BASIC, TEXT, TELCOM, etc.

If you have the Disk Video Interface (not required), the menu will appear on whatever screen you are using.

Men-u-utility only requires 1.8K of RAM and won't conflict with your other machine language programs.(100)

\$24.95

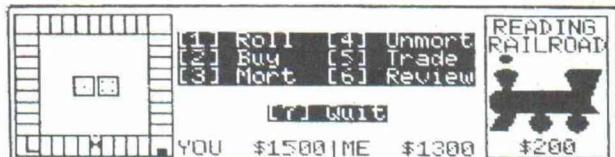


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*Monopoly is a trademark of Parker Brothers.

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Our assembler is the answer to your assembly language programming needs. It has all the features you expect in an assembler and more! It requires less than 3K of your valuable RAM space and is relocatable to any convenient place in memory. There are several useful macros already built in. You can output all or any portion of the assembled listing to your screen or printer. An extensive 56 page manual covers the use of the assembler, the complete 8085 instruction set, useful sample programs and LOTS of information on the ROM and reserved RAM areas. (100,200,NEC)

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Melody Maker

Melody Maker is a musical program generator. Simple cursor controls are used to select a note and position it on the staff making it easy to enter in sheet music. You can even use Melody Maker to add musical routines to your own programs. (100,200,NEC)

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BYTEFYTER

Now you can expand the memory capacity of your portable computer by reducing the size of the programs that you store in it. Bytefyter is a 100% machine language program that does just that. It is relocatable so that it won't conflict with any other machine language programs that you use now, or may use in the future.

Bytefyter works on your BASIC programs just as they are, IN PLACE. It strips unneeded spaces and remark lines. But that's not all! Bytefyter is smart! Bytefyter combines the lines of the BASIC program to whatever maximum length you specify. Each line of a BASIC program takes 5 bytes just for the line number and pointer information. By combining lines, Bytefyter saves a tremendous amount of space, space that could be used for another program or text file. Bytefyter actually checks the logic of your programs and doesn't combine lines that would cause the program to crash.

Bytefyter is amazingly fast. It will do its job on even the largest BASIC program in just seconds! You'll want to use Bytefyter on all your BASIC programs, whether you wrote them or bought them. (100,200,NEC)

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Renumber is a machine language program that lets you renumber the lines of your BASIC programs IN PLACE! Renumber adjusts all references to line numbers throughout the program. It is completely relocatable so it won't conflict with your other machine language programs.

Renumber is FAST! It will renumber even the largest BASIC program in just seconds. You can renumber all or just part of a program. You decide the starting line number and the increment to use. It couldn't be any simpler. This is one utility that the serious BASIC programmer just can't afford to be without! (100,200)

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CBUG

CBUG is the ultimate debugging tool for your lap computer. It only requires 3K of your precious RAM space and is relocatable to any convenient place in memory. CBUG is not just fast, small and easy to use, it is POWERFUL! With CBUG you can step through an assembly language program or the ROM while it displays the registers, the status of the flags, and associated memory locations. You can set breakpoints and execute your code to that point. You can step through call instructions with a single keystroke and return to the point after the call. CBUG does number base conversion, hex addition and subtraction, search and display, search and replace and block moves of memory. CBUG allows you to alter the values contained in the registers, display memory and load values into memory like a monitor program. (100,200,NEC)

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airmail delivery. U.S. funds only.



MCI UNDERRATED

Roger Strukhoff's article on electronic mail in the June issue of Portable 100/200 lamentably short-changed MCI Mail. Although MCI has added many features during the two years I've used the system, it's still more "friendly" than CompuServe, for example.

One year's enrollment costs \$18 and the fees for electronic mail are nominal. A 500-character memo is 45 cents; a 7,500-character letter is one dollar; a three-paged message costs two dollars to mail. Phone calls are free in major cities. Otherwise you can call through Tymnet for a nickel a minute. If all else fails, MCI has an 800-number which bills at 15 cents a minute.

Those are the only connect charges. MCI itself has none. On a local call you can putter around with the service's text editor without the usual pressure of a running meter. Familiarity with the system and prior preparation of letters in TEXT lets you zip in and out of the system in one minute plus upload time.

Strukhoff dismissed MCI as not providing "screen-to-screen electronic mailboxes." Not so. When you enter the name of the addressee, the MCI computer searches its directory. If it finds a match it posts your letter to that person's electronic mailbox. For an extra dollar, an operator will call the recipient to tell him/her a message waits.

If your addressee isn't a subscriber, the letter is transmitted electronically to the city nearest him/her where it's laser-printed and sent by U.S. Mail. Again, spend a little extra for guaranteed next-day delivery. Or spend 30 bucks for hand delivery in large cities within four hours.

Every subscriber gets a Telex number for sending or receiving international mail at lower rates than any other Telex service. For twenty bucks a year per graphic, MCI will make a facsimile of your signature or letterhead and print it on your letters. A \$49.95 encryption program makes your message undecipherable without a secret password. You also can keep a mailing list and do large-scale mailings of newsletters.

Charles Pitts
New York, NY

Indeed, Mr. Pitts is assiduous in his reading and accurate in his writing. I didn't tell the whole story about MCI and regret any problems this may have caused.

—Roger Struckoff

BUBBLES NOT BURST

I read your review of SoundSight's

bubble memory unit with much interest. Nevertheless, I found senior editor J.D. Hildebrand's article disappointing, confusing and poorly organized.

We have two bubble memory units attached to our Model 100s for storing order entry data and transferring it to our IBM System 34 using the Disk Plus ROM. We've been using the bubble units since March and have found them to be reliable, accurate and fast. And the unit isn't difficult to install, as was indicated in your review.

I've purchased accessories, hardware and software from at least eight advertisers in Portable 100/200, and I'd rate the service I received from the people at SoundSight as good to excellent.

I recommend trying the unit again. I'm sure you'll find it's outstanding in its performance, reliability, ease of use and installation.

Thomas F. Kohl
Green Bay, WI

We're sorry you found our review disappointing. We were disappointed, too, to find that the bubble memory disk emulator we received from SoundSight was not a production model despite more than six months of advertising.

We agree that the bubble memory is reliable, accurate and fast — and said as much in the review. Such products form an important part of the Model 100 business arsenal. Yet we simply couldn't recommend the unit shipped to us for evaluation. There were too many rough edges.

We're glad you had better luck with the product. Portable 100/200 will review the Magnetic Bubble Memory again when we receive a production unit. —Ed.

SHORT AND SEMI-SECURE

Here's a 23-byter that provides semi-security for the 100. The program will crash if the Pause key is held down while turning on the power. But by hitting Break, followed by Menu, you're back in business. That's enough protection for keeping honest folks honest.
1 POWER OFF,RESUME: IF INKEY\$ = "A" THEN MENU ELSE 1

Once in the machine, place the cursor over the program's file name and press Enter to turn off the 100. To get to the main menu, press A while turning on the power. If a key other than A (or no key) is pressed, the 100 will persist in turning itself off.

By the way, the same Pause-Break-Menu procedure defeats Goodman's security program, as run in the November 1984 issue of Portable 100. I'm surprised the book reviewer had to cold start his Model 100.

Jim McBurnett
Corinth, MS

DISABLED HOUSEBOUND IN SPITE OF TELECOM

I'm a twice-disabled person. I recovered from childhood paralysis and got through college with help from Vocational Rehabilitation. After almost 25 years as an engineer in industry I was disabled the second time.

With the shock and initial frustration past, I realize that most of my work experience is still applicable. Having used computers as problem-solving tools for almost 30 years, I know my skills could be useful to business and engineering clients. Severe physical mobility limitations make me housebound, but I can rely on telecommunications technology. However, advanced use of data communications and office automation technology only begin to address my problems.

I cashed in my life insurance to buy a Radio Shack TRS-80 Model 2. Rehabilitation agencies wouldn't or couldn't fund it. An attitude prevails that it's easier to keep the housebound on an endless education/training treadmill than it is to help them find meaningful home work.

The problems keeping the housebound from helping themselves can be solved with a personal computer and telephone modem. Yet I've found no clearinghouse through which businesses and telecommuters can arrange service contracts.

Have you or your readers any solutions to this? I've even tried using a salesman on a commission basis, with poor results.

Kenneth Willoughby
Fairacres, NM
CIS # 71565,2005

UNTAPPED MARKET

The 100 is a fascinating computer. There's a vast market for it among apartment dwellers and especially among women. However, Radio Shack's advertising hasn't been directed to this market. In addition, the software I tried seemed complicated to load and the manuals hard to follow. I hope that these problems can be overcome.

Paula S. Felder
Fredericksburg, VA

ATEX NOT GUILTY

This is in response to a letter from George L. Garrigues (Mail 100/200, June 1985), headlined "Wiped Out." As systems editor of the Philadelphia Daily News, I'm responsible for our 128-terminal Atex text editing system and for the (continued on page 52)

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PERIPHERAL SUPPORT

It all started on CompuServe's Model 100 Special Interest Group (SIG). Rumors had been flying for weeks: Is Tandy planning to enter the 3.5-inch disk drive contest? The speculation prompted SIG Sunday brunch discussions, frantic messages and wishful thinking about data-library files.

As this issue went to press, Portable 100/200 got the word from Tandy's Marketing Information department. Tandy *will* introduce a portable disk drive for the Model 100 and Tandy 200, possibly in November, at the retail price of \$199.95.

The battery-powered drive, as yet unnamed and unnumbered, will hold 100 kilobytes (K) of information on each 3.5-inch microfloppy disk. The data-transfer rate between the laptop and the disk drive would be at 19,200 bits per second — 64 times faster than the computer's built-in modem.

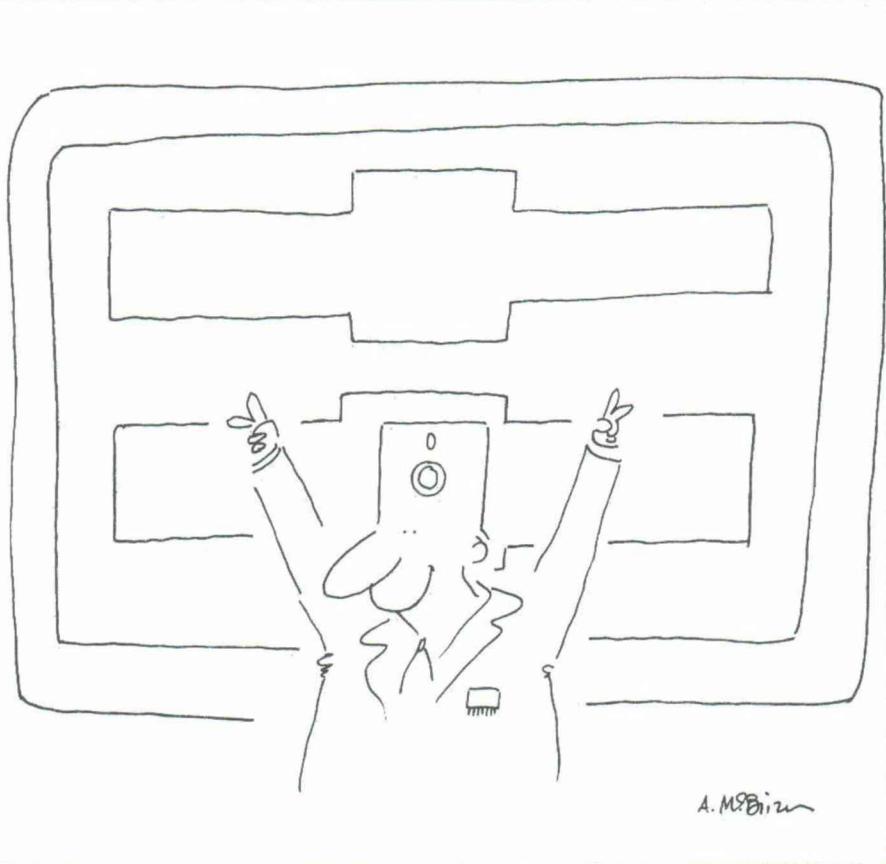
The disk drive will be completely menu-driven. A screen, similar to the main menu on the laptops, will display all files on a disk. The following commands will transfer the files to and from the Model 100 or Tandy 200: SAVE, LOAD, KILL and RENAME. A FORMAT command will initialize new disks. Software for configuring the drive, often called "boot-strapping" or simply "booting", will be included with the unit.

The disk drive runs on four AA "penlight" cells. A low-power indicator prevents the unit from beginning any operation when insufficient power remains in the batteries. At a mere 1 $\frac{3}{4}$ pounds, Tandy's drive measures 2 inches by 4 $\frac{5}{16}$ inches by 6 $\frac{1}{8}$ inches.

SIG SUPPORT

What does this mean to the SIG? SIG activity has changed to reflect the growing importance of mass-storage peripherals. Data Library Five (DL5), which once contained software for personal or home use, is now entitled, "Peripheral Support" (see Download by the Dozen, Portable 100/200, June 1985).

Over 75 peripheral-based files are stored in the SIG's new DL5. The lion's share target the Chipmunk 3.5-inch disk drive marketed by Personal Com-



puter Support Group (PCSG). Here are a few of the files:

SDCOPY.CHP - This BASIC program creates a machine-language utility simplifying the lengthy disk duplication process by reducing the number of disk swaps required.

SEARCH.CHP - This program shows exactly what's on a Chipmunk disk — track by track, sector by sector.

CHIPMK.D01 - A copy of the beginner's reference guide for the Chipmunk drive, thoughtfully provided by PCSG.

CHIPMK.D02 - The Chipmunk BASIC guide and warranty, also uploaded by PCSG.

Radio Shack's Disk/Video Interface (DVI) — Tandy's original mass-storage device for the Model 100 — is discussed in detail:

MENUD.DVI - A program for storing

and retrieving DVI files from a convenient menu.

DNAME.DVI - A way to change the standard DVI power-up message.

The old method of cassette file storage isn't neglected on the SIG:

RECOVR.CAS - This file describes how to save files when part of a tape has been erased.

MICRO.UPD - Handy information on using micro-cassette recorders for storing data or programs.

BITE THE BULLET

Files about the Chipmunk, DVI, cassette recorders and even Holmes Engineering's Bullet wafer drive are cached in DL5. Keep an eye on this area for the latest developments — often revealed here first. □

LIGHT UP THE SCREEN

Laptop owners can now see the light with Axonix's new backlight for the Model 100 and NEC PC-8201A.

The Thin E/L (\$199.95) is a factory modification to the laptop that illuminates the liquid-crystal display (LCD) in low-light conditions. The light source is an electroluminescent plate enabling LCD characters to be read up to five feet away, even in the dark.

Expected operation life of the Thin E/L is over 10,000 hours, and the light's internal rechargeable battery pack provides six hours of viewing.

The Thin E/L modification adds the light panel, off/on switch, brightness control and rechargeable battery pack to the Model 100 or NEC. The vendor provides a shipping container for the laptop to and from the factory. Turn-around time is two weeks.

Contact Axonix, 417 Wakara Way, Salt Lake City, UT 84108, (800) 821-7093.

Circle No. 81

Remote Disk Drive

Portable Computer Support Group's (PCSG) Enhanced Disk Plus (\$149.95) enables laptops to use desktops' disk drives — even on the road.

The Enhanced Disk Plus package contains a read-only memory (ROM) chip for a Model 100 and a program for any of several supported desktop computers, including IBM compatibles, Radio Shack TRSDOS-based computers and the Apple II. With Enhanced Disk Plus, Model 100 files can be transferred to and from the desktop.

Enhanced Disk Plus allows the desktop and Model 100 to be connected by either a null-modem RS-232 cable or by telephone modem. The software contains all desktop communications programming needed.

Enhanced Disk Plus includes a utility to convert Lucid (PCSG's ROM-based spreadsheet) files to VisiCalc or Lotus 1-2-3 format.

Owners of Disk Plus may upgrade to Enhanced Disk Plus for \$49.95. Contact PCSG, 11035 Harry Hines Blvd. No. 207, Dallas, TX 75229, (214) 351-0564.

Circle No. 82

Features for the FX

The LetterWriter kit (\$79.95) is a set of three ROM chips for the Epson FX printer. LetterWriter provides a crisp American Typewriter font at 32

characters per second.

The set increases the potential of the printer's master select control console. Sixteen features including NLQ print, italics, underscoring and condensed print can be turned on or off from the console.

Proper installation of LetterWriter doesn't void the printer's warranty, nor do the chips modify or remove any of the FX-series function.

Contact Dresselhaus Computer Products, 837 E. Alosta Ave., Glendora, CA 91740, (818) 914-5831.

Circle No. 83



Defend Against Static Charge

The First Touch Keyboard from 3M provides inexpensive protection against operator-induced static electricity.

The Model 9250 black rubber-like strip adheres to most keyboard designs and comes with a 10-foot cord for grounding to a cold water pipe or electrical conduit.

The words "Touch Me First" embossed on the strip remind the operator to touch it before contacting the computer.

Priced at \$19.95, the strip enhances or replaces cumbersome, expensive anti-static floor mats. First Touch is available at office-supply and data processing stores carrying 3M products.

Circle No. 90

The Ultimate Battery System for your Portable Computer



Prairie Power™ introduces a brand new battery, charger and carrying case that greatly extends the power and efficiency for lap-top computers such as the **Tandy 100 & 200, NEC 8201, 8401, Apple IIc, Epson and Sord.**

The heart of the Prairie Power system is the lightweight rechargeable battery pack that can, for example, power the Tandy 200 up to 160 hours. By comparison, its "AA's" last a mere 10-15 hours. By the time a Tandy 100 has used up 10 packs of "AA's" Prairie Power is ready for its first charge (180 hrs.) Our new battery system can even power the Apple IIc for 8 hours and contains a sophisticated circuit to warn when the battery is low.

A Compact System!

The Prairie Power system fits under any airline seat and measures only (17x13x5"). With Tandy 100, battery, case and charger, weight is only 12 lbs. Apple IIc system weighs 20 lbs. Battery is fully rechargeable, sealed, maintenance free, useable in any position and air transportable. Never again worry over shelf-worn "AA's"



The new two-step charger simplifies recharging by showing when the battery is charged and then switches to standby. You always know the battery is charged and ready-to-go, whether for emergencies or long trips on the road. Besides the assuredness and efficiency of a powerful battery system, Prairie Power will pay for itself over the cost of "AA's".

Best of all, the battery system and computer are housed in a handsome water-resistant padded Cordura case protected by support panels and thick foam inserts that hold computer, battery, charger, cables and accessories. A padded pocket can also hold a flat-panel screen, small recorder or 3.5 "drive and manuals. **Call our toll-free number today!**



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NEW PRODUCTS

Past and Present

Have instant access to data scrolling the screen with FullVu 100 from Thomas Software.

The FullVu 100 (\$39.95) communications program captures a terminal session to a cyclic buffer. This buffer can be examined any time without breaking the connection.

The data-capture buffer expands to fill available random-access memory (RAM). Upon completion of the session, the buffer memory is released back to the operating system.

FullVu 100 uses the Model 100's ADRS.D0 file for automatic dialing and logon. A telephone number can also be entered from the keyboard.

The Model 100 arrow keys are used to navigate the screen buffer. Depending on the amount of free RAM, 50 or more screens can be stored. The function keys control XON/XOFF, Ctrl-C, automatic linefeeds, full/half duplex, print echo, data capture on/off and buffer clearing.

Contact Thomas Software, 2632 Sumac Ridge, White Bear, MN 55110.

Circle No. 84

Arm Your Laptop

The ARMS Power-200 rechargeable battery (\$49.95) provides 15 hours of power for the Model 100, Tandy 200 or NEC PC-8201A.

Power-200 is a six-ounce tube, 10 inches long by 5/8-inch in diameter. Velcro provided with the battery attaches it to the laptop. Power-200 is rechargeable by AC power.

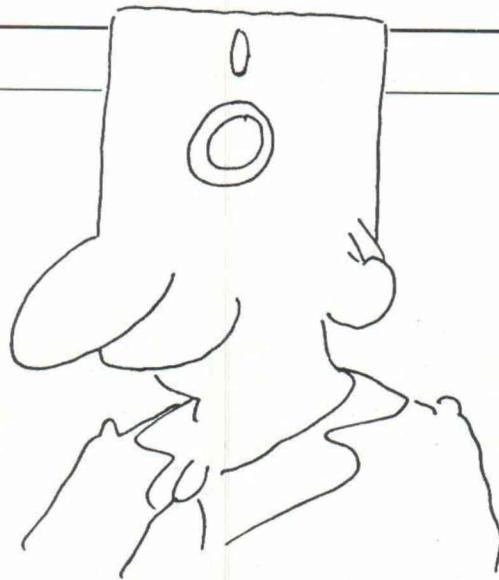
Power-200 also can fuel the Tandy TRP-100 printer and CCR-82 cassette recorder, as well as PCSG's Chipmunk disk drive.

Contact ARMS, 12131 Old Buckingham Rd., Midlothian, VA 23113, (804) 794-6675.

Circle No. 85

Wrap Up The Case

Prairie Power's newest external battery system and carrying case (\$169) provides a Tandy 200 with 160 hours of continuous usage.



Olivetti M10 and NEC PC-8201A.

Contact Traveling Software, 11050 Fifth Avenue N.E., Seattle, WA 98125, (800) 343-8080.

Circle No. 87

The Art Of Computing

Now there's a free bulletin board for the performing arts community.

The 24-hour Electronic Call Board contains over 500 kilobyte (K) of entertainment and theatre listings, casting notices, want ads, an online magazine and electronic mail.

Sections of the bulletin board cover theatre, film, video, dance, art and music. File transfer protocols include ASCII and XMODEM. The access number is (718) 499-1633. Configure for 300 bps at seven-data bits, even parity.

Contact Atmospheres, 1207 Eighth Avenue, Brooklyn, NY 11215.

Circle No. 88

Travel To Your Desktop

The One Box Solution brings Traveling Software's laptop programs to IBM PC-compatible desktops.

The One Box Solution bundles laptop and desktop versions of software with a data transfer program, Desktop/Laptop Bridge.

The line currently includes the Traveling Project Manager, Traveling Expense Manager, Traveling Appointment Manager, Traveling Sales Manager and Traveling Time Manager (\$99.95 each).

The Desktop/Laptop Bridge runs on the Hewlett-Packard 150 and IBM PC compatibles. Laptop software is available for the Model 100, Tandy 200,

Playing With The 100

Infosoft's newest computer game, Jackrobat (\$19.95), brings arcade entertainment to the Model 100.

Jackrobat uses machine-language graphics and sound to produce a multi-level real-time game.

Contact Infosoft Software Systems, P.O. Box 1484, Groton, CT 06340, (203) 448-1126.

Circle No. 89 □

INTRODUCING THE

SIDESTAR

FOR THE NEC STARLET

The SideStar is a self-contained, plug-in, 128K RAM-disk cartridge the size of a wallet. It gives you more than memory—the SideStar gives your NEC Starlet (PC-8401A) new abilities.

Now Run the Powerful Software that Requires More Memory

DBASE II and many of the powerful CP/M software packages require a lot of memory, which means using 64K mode and a disk drive. (There goes speed and portability.) When a disk drive isn't feasible, your SideStar takes over. Now you can load and run large disk-based software at RAM speeds—any time, anywhere.

Expansion Connector Adds Flexibility

With the SideStar in place, the NEC Disk/Video Adaptor, 1200 baud modem, or other cartridge can be plugged into the SideStar's expansion connector. Now you can load and store programs or data from any source directly with room for up to 124 files. A single file can be 124K (126,976 bytes) long!

Forget About Changing Batteries

A 1.2 Amp Lithium battery sealed inside will power the SideStar for 5 to 7 years—into the next decade!

Is It Disk—or—Is It Ram?

Think of the SideStar as a diskette. It's a self-contained, mass-storage device that requires no outside energy

source. It can be used for transporting information between computers, long term storage, and temporary storage. Unlike a diskette, it doesn't require a disk drive, power supply, or cables—and it's very, very FAST! To the Starlet it's a disk.

A No Risk Offer

You can buy the SideStar for a 30-day evaluation. If you are not completely satisfied, return it within 30-days for a full and prompt refund. You get a 2-year warranty on parts and labor. If your SideStar should ever need service, we will fix or replace it within 72 hours.

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Circle 45 on Reader Service Card

It's the Holmes Engineering/PCSG "chipmunk"

PORTABLE

Disk Drive

for the Model 100/200

Uses the main menu concept. You see the disk directory instantly, arranged on your M-100 screen like your main menu. Just move the widebar cursor and transfer files with a function key. You can run a file directly from the diskette with the ENTER key. Uses 3½" microfloppy diskettes that have a rigid plastic casing and a metal core. They're tough and nonflexible. You can carry several in a shirt pocket without damage. There's 358K on a diskette. Ten of these in your briefcase and you've got 3½ megabytes.

Drive weighs only three lbs. and it works directly from the 110 outlet and recharges at the same time. It recharges in six hours with thousands of pages transferred between charges. It's compact, with dimensions of 2¼" x 5½" x 7.5"; and fits easily into your briefcase along with your Model 100 or 200.

Machine code programs, BASIC programs, *Lucid* files and documents all are saved and retrieved with no protocol—instantly, ready to run.

In a special association, Holmes Engineering and PCSG have worked together combining the hardware knowledge of Holmes and the software expertise of PCSG. The result is a product that can only be regarded as excellent.

You see the disk directory instantly; works just like the main menu

Here is what is really exciting. The portable disk drive has Random Access. Included as part of the operating system in the drive (ROM) is a very powerful disk BASIC.

This means that you can have BASIC programs that will access the diskette and read and write records directly on the diskette.

Just imagine yourself with this kind of capability.

Database—The portable disk drive stores your mailing list, inventory items, part #'s and descriptions or any other data that you need to recall.

358K on a diskette

Invoice (purchase order)—At the touch of a button you can print out your sequentially numbered, professionally done invoices. This is truly professional invoicing capability.

Purchase orders are just as easy.

Sort—This excellent utility allows you rapid sorting of any records you have compiled. You can write the newly sorted list back in the same file on the diskette or to a new file.

Telecom interface—If you are a user that likes to access other computers or databases (for example CompuServe) by telephone then this powerful facility alone is worth the price of the disk drive. You can automatically download and upload information onto the diskette.

Calendar—Everyone who has seen this program has said, "This is the first calendar/

diary/scheduler on any computer anywhere that I can use. It is so functional."

The calendar program is usable for two reasons, first it is designed correctly, and second you have the memory (358K) on the diskette to log and access a tremendous amount of notes over a long period of time.

Personal Finance Manager—This wonderful program truly lets you keep track of your finances.

All your records are kept on the diskette. Bank accounts (checking and savings) and charge accounts such as MasterCard and Visa.

We at PCSG believe we have the ultimate Model 100 system, the Portable Disk Drive plus the *Lucid* spreadsheet on snap-in ROM, *Write ROM* word processing and the new 64K RAM expansion now available from PCSG.

We want you to find out for yourself at no risk. If you aren't totally satisfied within 30 days, simply return the disk drive for a full refund. Priced at \$599.95, including the software library, MasterCard, Visa, COD.



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Circle 37 on Reader Service Card

Step by Step to Easylink

Western Union's Easylink takes the guesswork out of field communications

By Hugh Evans

Nothing beats a viewable, carefully formatted message when you need answers in the field. Field communications via telephone can be complicated and frustrating.

Western Union's Easylink is a convenient field communications service. The system serves any location with a telephone. Each message sent goes into a "store and forward" buffer. It's retransmitted in the proper format to the location designated as soon as the system's teletype is available.

No special formatting is necessary to send messages. Just type messages into a SEND file and Western Union provides the compatibility for both telex and teletype machines. The operating procedure is easy to use and economical. No special program is needed. Rather, two entries in the ADRS file complete the task using the 100's built-in modem or acoustic coupler.

Messages sent are stored up to 10 days in the recipient's mailbox. After that, Western Union notifies the sender that the message was undeliverable and has been cancelled and filed. This procedure applies to incoming as well as outgoing mail.

Messages received are stored in a file in the Model 100, ready for printing.

Easylink is economical. The base charge is 25 dollars per year for domestic service and 25 dollars per month for international service. Mailbox checking via a local access telephone number is free. Using the toll-free number costs 20 cents per minute plus a 20-cent connect charge. The same applies for sending messages.

Sending charges vary, depending on the destination and equipment used. A transmission from a SEND file at 300 bps costs about 35 cents per minute plus a 20-cent address charge. Sending to a Western Union Telex number costs 50 cents per minute. It's more expensive to send to other Telex carriers.

TEST BEFORE YOU SIGN

Before signing up for their service, it's a good idea to try out Western Union's test message. The first step is to check the status stored in the Model 100 TELCOM file (see the Model 100 owner's

manual, page 85). It should read *M711E,10 pps*.

The telephone facilities in most areas provide reliable operation at 20 pps but in some areas it's necessary to use 10. With the status verified, return to the main menu.

Create three files called SEND, RECV and WUNOW. SEND and RECV will be used for messages while WUNOW will be sent to those needing to know your teletype address, how to use the system and what to expect. Here's a typical message:

I'm pleased to notify you that the Atlanta office now has teletype capability.

This isn't a direct line to a fixed site but a "store and forward" mailbox. I'll be able to retrieve your messages from any field location by using my computer.

To send me a TELEX or TWX, use Easylink "12345678" for my address. No signal indicates that a message is waiting, so I'll check my "mailbox" at frequent intervals. Accordingly, there may be some delay in your getting a reply.

Reach Easylink by typing 4112 and following the prompts. After sending the message, close with MMMM and a carriage return. Wait until the ACCEPTED message is received.

Please respond with a brief message so the teletype loop operation will be verified.

Regards,

Since the 100 has automatic dial capability, the ADRS file should have in it these addresses: WUSEND, WUMAIL and WUTEST. Enter these exactly:

*WUSEND:18003254112<=??=00
ESLaaaaaa uuuuuu.ppppp^M>:*

*WUMAIL:18003254112<=??=00
ESLaaaaaa uuuuuu.ppppp^M?S=/MBX>:*

*WUTEST:180032454112<=??=00
USR999999 TEST.TEST^M>:*

On the TEST adrs, after proceed to send (PTS) is displayed, enter = /ESL TESTM.

In the above strings, A is your personal account number, U is your user number (I.D.) and P is your password. All three are assigned by Western Union.

The ^ M signals Control-M (Ctrl-M) or carriage return. When entering this code, use Shift-6, then M, as this will insert an actual carriage return into the ADRS file.

READY TO OPERATE

Begin operations after making these entries. Western Union will accept messages only if this procedure is followed. Terminate transmissions only after seeing the ACCEPTED response. A cancellation message looks like this:

We cancel and file the following message . . . addressed . . . reason: Unable to establish connection with destination. No alternate routing provided. We cancel and file.

To send a message from TELCOM, press F1 (Find), type WUS and press Enter.

Press F2 (Call). When the screen shows PTS, enter the numerical address of the location to receive the message. Append a + and press Enter.

When the screen shows GA (Go Ahead), press F3 (Upload).

The prompter will ask for the file name to be uploaded. Type Send or WUNOW.

The prompter asks for width. Enter 40 and press Enter. Note that 72 is the maximum width for a teletype.

Transmission begins immediately and is shown by the reverse video on the Upload label. When transmission is complete, the reverse video disappears. Type MMMM.

Wait until the ACCEPTED message appears, then press F8, Y and Enter.

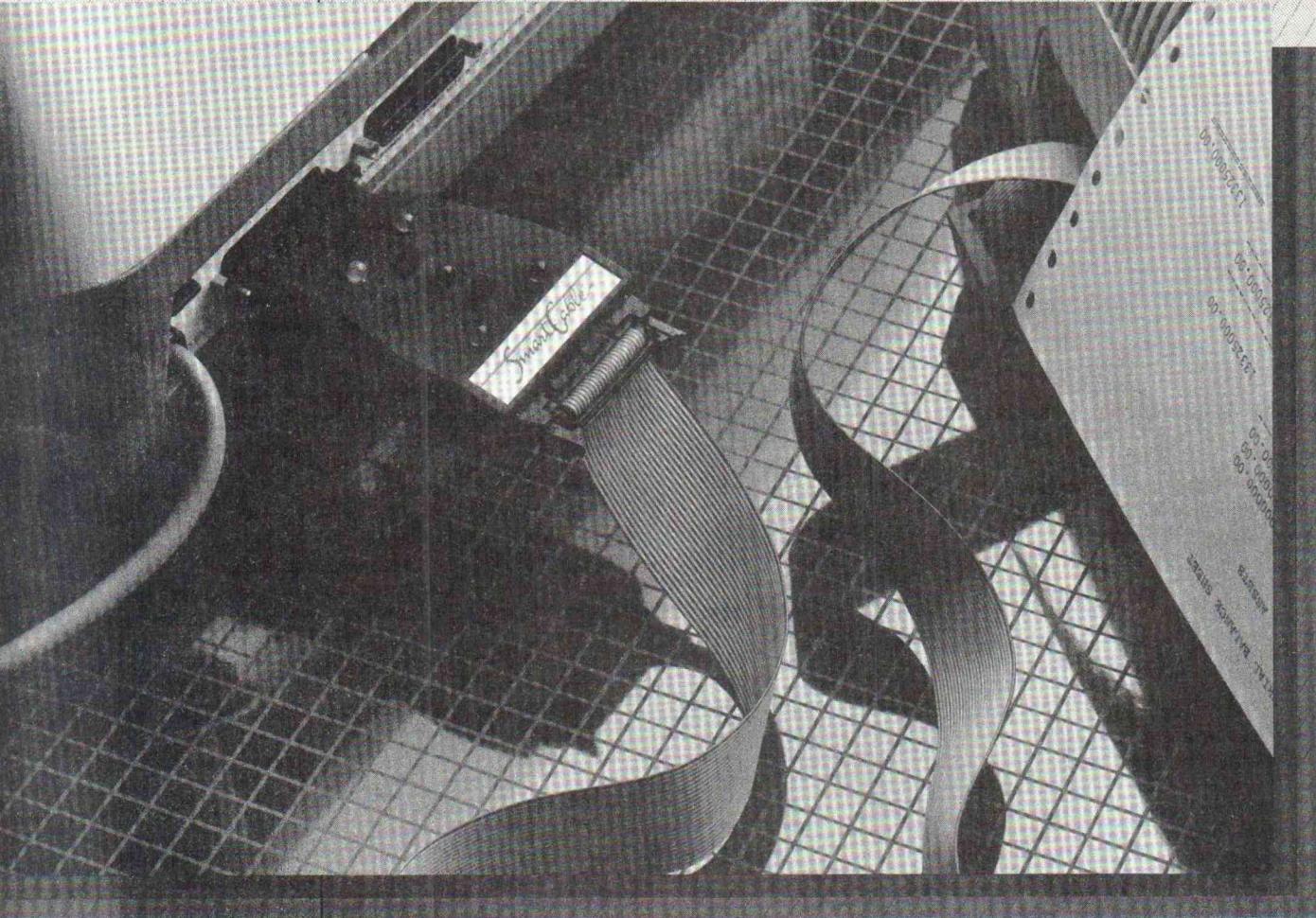
Press F8 to return to the menu.

(continued on page 68)

Hugh Evans is district sales manager, Atlanta, for Gould Incorporated, Imaging and Graphics division. He's been working with computers for twenty-five years and logging onto Easylink for the past two years.

TRAVELING COMPANION

The smartest way to connect your portable to the nearest printer.



You wanted your work to travel with you. That's why you bought a laptop computer. But until now, you couldn't do anything with that work until you got back to the printer or modem at the office.

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Take Note

Your 100 aids library research, card catalogue shuffling

By Hugh M. Ferguson

Library notetakers, take heart. The Model 100 is the ultimate index card. Carry it on research forays for faster and more accurate notetaking. Whether you're a biographer, student, paralegal or genealogist, the 100 can improve your research efficiency.

Be advised that the Model 100 may not be welcome in the library. The Library of Congress requires registration of the machine at the door. According to on-duty guards, failure to register may result in temporary confiscation. It's the library's method of making sure government property stays in the library.

The New York Public Library doesn't require registration, but its guards eye the 100's soft vinyl case with suspicion. Briefcases are banned as a security risk. The guard on the research floor of the Lincoln Center branch at 65th Street takes the 100 and dips it into a glass box. It fits with a half inch to spare. If it were a half inch wider, it would have to be checked as a briefcase at the first-floor cloakroom.

Once you're inside and at work, a more serious problem may loom: keyboard noise. One researcher reports clipping along at 90 words per minute at Lincoln Center, only to be pulled over by a librarian. He was cited for typing without a muffler and banished to an airless, windowless room in the back of the library which he shared for the rest of the day with a pile of packing crates and damaged furniture.

Avoid such exiles by purchasing Quiet Key, a bunch of tiny rubber bands which are installed beneath the keys to soften the click. Install them yourself, ask Radio Shack to install them for about 15 dollars or see "Rubber Band Plays Silently on Model 100" (Portable 100, October, 1984) for a less expensive but similar do-it-yourself solution.

The 100's only other library problem is vulnerability to theft. Keep track of your 100 using the M-Strap, a simple attachment to the 100's soft carrying case. The 100 will hang from your shoulder leaving both hands free. It's indispensable despite one drawback: It slides off when you lean over the photocopying machine.

Little else is needed when you take



The Model 100 eliminates tedious note-taking steps and improves research accuracy.

the 100 to the library. A pencil is handy for editing a hard-copy bibliography or propping open the file while keyboarding information. Enter bibliographic information and copy call numbers from the 100's LCD display. This eliminates losing bibliographic references.

Index cards pressure researchers to chop ideas into little pieces. Before you can record a hunk of information, you must decide whether to separate its elements onto different cards, or summarize them on one. How many comely concepts have you disfigured, driven to precipitous butchery by the arbitrary demands of those little cardboard tyrants?

The 100 allows transcription of long, complex passages, and strings of notes can be saved in their original sequence.

Type in each source once when first taking notes from it. At the end of each excerpt, type in the page number preceded by a caret. For example, page 24 would be entered as <24. Later, with everything transferred to a desktop system, use find-and-replace to insert the

name of the source between the caret and the page number.

Innovative punctuation on the 100 can make research notes more manageable once they're on the host system. Begin the transcription of long quotes with a "double equals" sign (==). It stands out better than quotation marks, but more importantly, allows transcription of the quotation marks of any source verbatim, without getting mixed-up about whose quotation marks originally belonged to whom. Break into the quotation with a paraphrase or a comment using double parentheses. Indicate a source's footnote with asterisks and a parenthesis — *(*) — and put the footnote itself in parentheses.

(=This=) indicates square brackets, which library cataloguers and bibliographers love. They're available on the Model 100 keyboard, but can't be used by word processors that translate the right-hand ones into carriage-returns. □

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Screen Graphics not just for LCDs

A sprinkling of pixel magic has your 200 printing masterpieces

By Jim Irwin

The days of screen-only graphics are over. Now, beautiful drawings, business graphs and custom screens can be created on the Tandy 200 display — and printed on any impact or dot-matrix printer. (Model 100 users can do screen dumps too. Please see Dave Cloutier's article, "What You See Is What You Print", Portable 100, Dec. 1984, pg. 26.)

Tandy 200 graphics, like those of the Model 100 or a newspaper photograph, are comprised of small picture elements (pixels) that are either dark or light. The Tandy 200 uses small squares on the liquid-crystal display (LCD) for pixels. These are turned on (black) or off (white) whenever characters are printed to the display, or by the BASIC PSET and PRESET statements.

The Tandy 200 contains an 8 kilobyte (K) random-access memory (RAM) chip dedicated to storing the pixel status of the LCD. Each byte contains the status of six pixels. The cursor is made up of eight rows of pixels, each row six pixels wide. Individual bytes of information in the LCD RAM contain the status of one six-bit row of pixels.

The LCD 200 screen is a matrix of 240 by 128 pixels — a total of 30,720. Only 5,120 bytes are needed to store all the information. The 8K RAM is used as a circle of screen memory. The computer doesn't move all the screen characters when it scrolls. The LCD RAM start address changes and adds new lines at the next available address. When the start address gets to the end of the RAM, it "wraps around" to location zero.

Each byte in the LCD RAM uses only bits zero through five to store the status of six pixels. Each bit has the decimal value of 1, 2, 4, 8, 16 and 32, respectively. If all pixels are on, the sum of those numbers is 63. If all are off, the sum is zero. Each decimal sum refers to a unique combination of activated picture elements.

James Irwin is a mechanical engineer for Eaton Corporation in Michigan and has been involved with computers since 1971. Says Irwin about the Model 100, "it has much more capability than the first computer I worked with, even though that one filled a room!" — Ed.

— BIT —

0	1	2	3	4	5	
*	*	*	*	*	*	= 1+2+4+8+0+0 = 15
*	*	*	*	*	*	= 1+0+0+0+16+0 = 17
*	*	*	*	*	*	= 1+0+0+0+16+0 = 17
*	*	*	*	*	*	= 1+2+4+8+0+0 = 15
*	*	*	*	*	*	= 1+0+4+0+0+0 = 5
*	*	*	*	*	*	= 1+0+0+8+0+0 = 9
*	*	*	*	*	*	= 1+0+0+0+16+0 = 17
						= 0+0+0+0+0+0 = 0

Bit 5, the farthest right column of each character position, is used only for graphics. The bottom row is used for graphics and for letters with descenders.

WHERE'S THE BYTE?

LCD RAM address zero refers to the six pixels at the top left corner of the LCD. Addressing continues from left to right. Address 39 is the top, right six-pixel group. Address 40 is directly below address zero. The bottom right pixel group is address 5119.

This concept of pixel addressing is very similar to the PRINT @ character location used in BASIC. Counting starts at the top left of the screen and goes left to right before progressing down the screen. The difference with pixels is that the screen has 128 instead of 16 lines.

The Tandy 200 read-only memory (ROM) routine that provides pixel status begins at address 36272. The routine returns eight bytes of pixel information. The pixel status routine that looks at *R* returns the numbers 15, 17, 17, 15, 5, 9, 17 and 0, in that order. Disassembling the 36272 routine shows an ADI 40 instruction at 36288 which adds 40 to the screen address value.

The pixel status routine will place eight bytes in the 200's memory at any location, with the following conditions:

- Addresses 65188 and 65189 contain the location of a safe 8-byte area to put the pixel status. This can be an area of RAM reserved by the CLEAR command or RAM above address 61104 (Tandy 200 MAXRAM value). This area is normally reserved for Tandy 200 use, but there are locations not used by BASIC.

• The 80C85 CPU's DE register identifies the starting screen address for the 8-byte pixel map. Screen location zero may not be RAM location zero. The ROM routine at 36272 takes care of this. It calls another routine which automatically adds the appropriate offset. The offset is stored in 65196 and 65197.

Table one is a short machine-language routine that returns pixel status from a single BASIC CALL. The routine puts the requested screen address in register DE and available pixel storage address in 65188 and 65189. It then branches to ROM address 36272.

The following BASIC program will demonstrate the pixel status routine:

```
10 DATA 235,33,10,250,34,164,254,  
195,176,141  
20 FOR I=64000 TO 64009:READ N:  
POKE I,N:NEXT  
30 CLS:PRINT @ 0,"R":CALL  
64000,0,0  
40 FOR I=64010 TO 64017:PRINT  
PEEK(I);NEXT
```

RETURN THE CALL

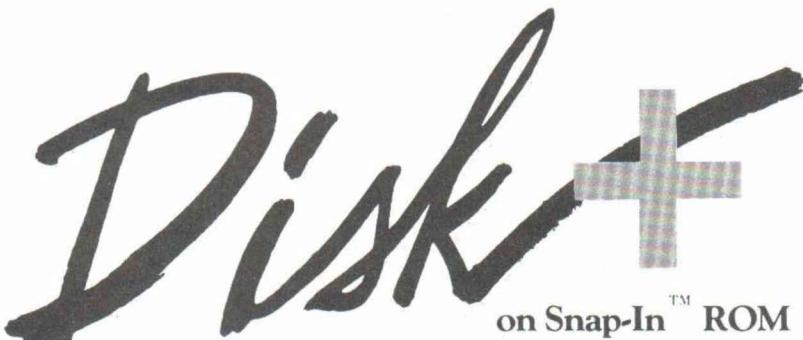
Running the program returns the pixel map for the character in the top left corner of the screen. Line 10 is the coding for the machine-language (ML) subroutine. Line 20 loads the data at 64000-64009. Line 30 clears the screen and prints an *R* at location zero. Then the ML routine is called. The CALL command is formatted *CALL adrs,A,HL*, where *adrs* is the address of the ML subroutine; *A* is the contents of the *A* register; and *HL* is the contents of the *HL* register.

Line 40 prints the pixel status. Impact printers don't have dot-matrix capability, but many impact printers can be programmed for narrow character and line spacing. A period printed can indicate each black pixel. Figure one was printed using this method.

Dot-matrix printers often have a "bit-image" graphics mode. This provides precise horizontal and vertical spacing for printing individual elements.

Printer control codes aren't standardized. Below is information for Dynax,

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To save a file to your other system's disk drive, you just move the widebar cursor to the file you want to save and press ENTER. It is saved instantly with no further action.

To look at the disk directory, you just press a function key on your Model 100. You see immediately the disk directory on your Model 100 screen, and it is arranged just like your Model 100's main menu.

To load a file from the diskette to your Model 100, you just move the widebar cursor to the file and press ENTER. The file is transferred to your Model 100's RAM instantly. You can press F8 and go back to the main menu, and the file you loaded from diskette is there, ready to use.

It is so nice to be able to keep your documents, programs (both BASIC and machine code) and *Lucid* spreadsheet files on the diskette, and bring them back when you need them. All files are ready to run or use with no changes or protocol by you.

If you have access to a desktop computer and don't have *Disk+*, then evidently we have done a poor job telling you about it.

All files and programs that you load or save, go over and come back exactly as they are supposed to be because of full error checking. This guaranteed integrity is really a comfort. *Disk+* is wonderful in so many other ways. For example, you can do a "save all" of all your RAM files with just a touch of a function key. That group of files is saved on the diskette under a single filename with a .SD (for subdirectory) extension. Any time you want, you can bring back all those files at once, or just one or two if you like, again with one-button ease.

Disk+ takes up no RAM. That's zero bytes either for storing the program or for operating overhead.

What really excites most *Disk+* users is text file cross compatibility. Your Model 100's text files are usable on your desktop computer, and your desktop's text files become Model 100 text files.

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Incidentally, hundreds of Model 100 owners have gone to their Radio Shack stores and bought a color computer because it is so low priced, and with *Disk+* they have an inexpensive disk drive.

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PIXELS

Epson and Texas Instruments printers. One of these may be similar to yours. With minimal modification the screen dump techniques presented here will work.

PREPARE FOR IMPACT

Listing one is for a Dynax Brother printer.

Lines 1000 call 1/40-inch horizontal and 1/48-inch vertical spacing.

Check your printer manual for the control codes applicable to your printer. The above spacing makes a screen dump six inches wide and about three inches long. It fits nicely across an 8.5 by 11-inch page.

Lines 1020-1040 load the machine-language routine into HIMEM.

Line 1050 starts two loops. The outer loop goes from zero to 127 moving down. The inner loop goes from zero to 39 moving across.

Line 1060 computes the screen address and calls the pixel status routine.

Line 1070 starts a loop to examine each pixel in the row.

Line 1100 isolates each bit by ANDing pixel data with 1, 2, 4, 8, 16 and 32.

Lines 1110 and 1120 print a space or period.

Line 1130 has the NEXT statements for the loops. LPRINT sends a carriage return at the end of each line of pixels.

The loop values in line 1050 can be adjusted to print only a portion of the screen.

Although the ROM routine returns eight bytes of pixel information, only the first byte is used. Impact printers produce only one period at a time.

MATRIX INVERSION

Dot-matrix printers have a greater dot density than impact printers. The dot density of dot-matrix printers such as Epson, Okidata and Texas Instruments is 72 dots per vertical inch. These printers also have a mode allowing 60 or 72 dots per horizontal inch. Selecting these modes creates a screen dump reasonably proportional to the screen itself. Using only one printer dot for one screen pixel creates a dumped screen image about 3.3 by 1.8 inches.

The program in Listing two prints two horizontal and two vertical dots for each screen pixel. The result is a 6.6 by 3.6-inch screen dump.

Line 2000 sends initial control codes to the printer. Unidirectional printing better aligns the dots. Line spacing is set to 2/72 of an inch.

Lines 2010-2020 load the machine-language routine.

(continued on page 51)

listing one X-Y Graph Program

```
1000 LPRINT CHR$(27);CHR$(31);CHR$(4);
1010 LPRINT CHR$(27);CHR$(30);CHR$(2);
1020 DATA 235,33,10,250,34,164,254
1030 DATA 195,176,141
1040 RESTORE 1020
1050 FOR I=64000 TO 64009:READ N
1060 POKE I,N:NEXT
1070 FOR X1=0 TO 127:FOR X2=0 TO 39
1080 AD=X1*40+X2:CALL 64000,0,AD
1090 FOR X3=0 TO 5
1100 X4=PEEK(64010) AND (2^X4)
1110 IF X4=0 THEN LPRINT" ";
1120 IF X4>0 THEN LPRINT".";
1130 NEXT:NEXT:LPRINT:NEXT:RETURN
```

listing two Sample Data for X-Y Graph Program

```
2000 LPRINT CHR$(27);"U";CHR$(27);"A";CHR$(2);
2010 DATA 235,33,10,250,34,164,254,195,176,141
2020 RESTORE 2010:FOR I=64000 TO 64009:READ N:
POKE I,N:NEXT
2030 FOR X1=0 TO 127:
2040 LPRINT CHR$(27);"N";CHR$(224);CHR$(1);
2050 FOR X3=0 TO 39
2060 AD=X1*40+X3
2070 CALL 64000,0,AD
2080 X=PEEK(64010)
2090 FOR X4=0 TO 5:X5=X AND (2^X4)
2100 IF X5>0 THEN X5=96
2110 CALL 5520,X5:CALL 5520,X5
2120 NEXT:NEXT:LPRINT:NEXT:RETURN
```

For Epson MX100 with Graphtrax:

```
2000 LPRINT CHR$(27);"U";CHR$(27);"A";CHR$(2);
2040 LPRINT CHR$(27);"L";CHR$(208);CHR$(2);
add:
2125 CALL 5520,X5
```

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Solutions in the Field

By R.B. Diffenderfer

Corrosion of underground equipment in the New York metropolitan area is nothing new — until the Model 100 is chosen to help correct the problem. Expensive field testing of a telephone company's troubled multi-transit system has been simplified by the 100's use.

Studies of the afflicted area included a series of simultaneous voltage readings. For example, the voltage between a telephone cable and a reference cell placed in the earth is read at the same time as the voltage between the cable and the negative bus of the transit company's power station. These voltages fluctuate constantly, so a number of simultaneous readings are made. Plotted on an x-y graph, the readings provide the basis for determining corrective action.

This type of testing is conducted infrequently, so most utilities can't justify the purchase of expensive x-y plotters suitable for field use. Without plotters, tests of this nature generally involve a lengthy series of steps. After a day of taking field readings, several more days are spent in the office plotting the readings. Interpretation of the results indicates where more readings are required and the process is repeated.

A few evenings before the scheduled field work in New York, I developed a program (Listing one) that accepts the x-y readings and plots them on the Model 100's screen. This proved invaluable in the field. When I called out *read*, my associate pushed a hold button on each of two digital meters and read aloud that moment's voltage readings. I typed them into a text file in the Model 100. No paper notes were required.

ANALYZED IN THE FIELD

The program enabled us to take eleven sets of readings the first day. After each set of 30 or 40 readings, we ran the program to obtain a plot of the graph on the screen. This allowed us to analyze immediately after each set of readings and determine what further data was required.

The program provides an optional hard-copy printout. At home that evening I printed out the day's graphs on my Epson RX-80. Studying them pro-

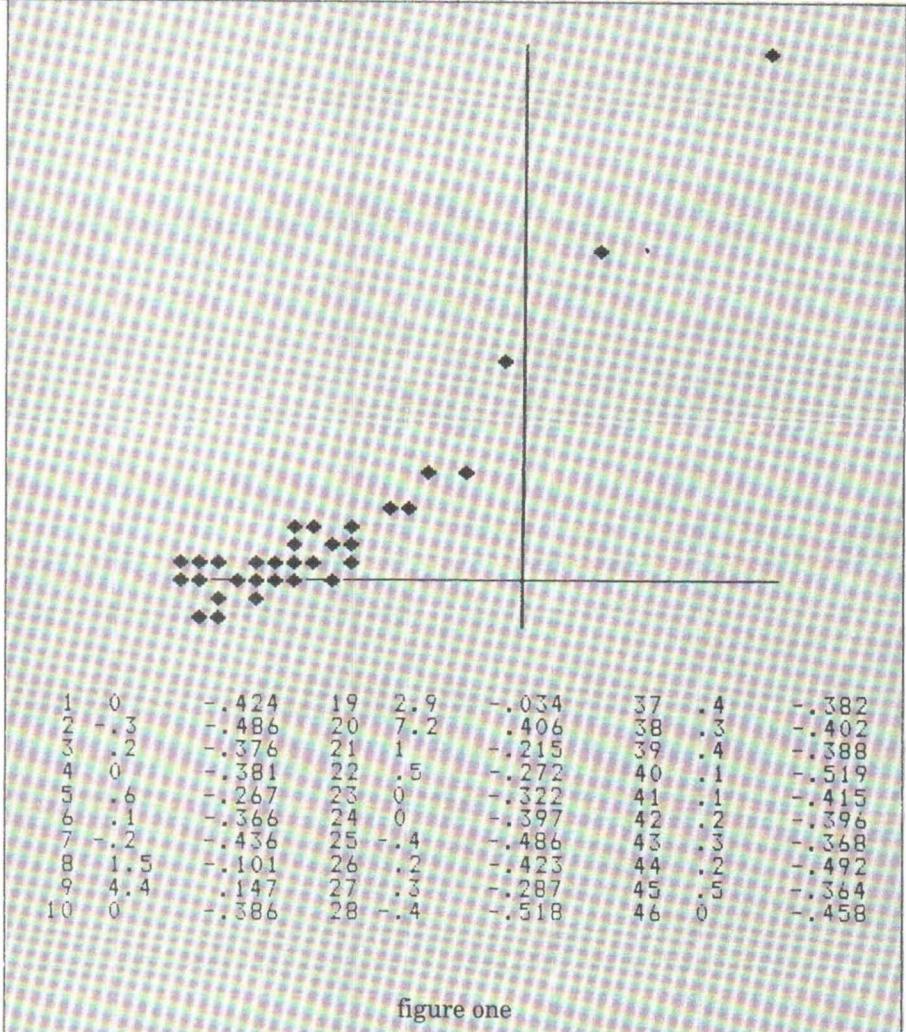


figure one

vided information for planning the next day's work. By noon of the second day we had completed seventeen sets of readings.

If we had used the traditional method of recording in field notes and plotting the data on graph paper, the process would have stretched over most of a week. We'd have been unable to determine in the field further data needed. In addition, an x-y plotter wouldn't have been feasible since we took readings at remote locations using two-way radio communications.

Programing isn't my expertise. This

use of the Model 100 exemplifies what an amateur programer can do. With greater proficiency I could print the coordinates immediately on the graph and drive individual pins on the dot-matrix printer to produce more precise graphs. Nonetheless, this program worked beautifully.

Figure one is a printout of a set of readings. The lines in the graph always represent the zero coordinates, no matter what the range of the readings. The actual voltage readings are printed below the graph to assist in the interpretation of the results.

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FIELD NOTES

```

100 CLEAR 1000:DEFINT I-N:DEFSNG P-Z:DEFSTR
A-C:DEFSTR R(101,2),KP(33,33),KS(33)
110 INPUT "FILE";AFILE:OPEN AFILE FOR INPUT
AS 1
120 S1=-100:S2=100:T1=-100:T2=100
:INPUT#1,A,B,C,Y,Z
130 FOR I=1 TO 100
140 IF EOF(1)THEN 270
150 INPUT#1,P,Q:P=P*Y
160 IF Z=1 THEN Q=Q*(-1)
170 R(I,1)=P:R(I,2)=Q
180 IF P>S1 THEN S1=P
190 IF P>0 THEN M1=1
200 IF P<S2 THEN S2=P
210 IF P<0 THEN M2=1
220 IF Q>T1 THEN T1=Q
230 IF Q>0 THEN N1=1
240 IF Q<T2 THEN T2=Q
250 IF Q<0 THEN N2=1
260 NEXT I
270 N=I-1:CLS:PRINT A:PRINT B:PRINT C
280 S4=S1:S5=S2:T4=T1:T5=T2
290 S3=S1-S2:T3=T1-T2
300 IF M1<>0 THEN 320
310 S3=S2:K1=0:S4=0:GOTO 350
320 IF M2<>0 THEN 340
330 S3=S1:K1=62:S5=0:GOTO 350
340 K1=(S1/S3)*62:CLS
350 PRINT "VERT: ";S4;" TO ";S5
360 IF N1<>0 THEN 380
370 T3=T2:L1=202:T4=0:GOTO 410
380 IF N2<>0 THEN 400
390 T3=T1:L1=140:T5=0:GOTO 410
400 L1=((0-T2)/T3)*62+140
410 PRINT "HORZ: ";T5;" TO ";T4
420 LINE(140,K1)-(203,K1):LINE(L1,0)-(L1,62)
430 L6=(L1-140)/2:K6=K1/2
435 FOR I=0 TO 31
440 KP(L6,I)=8:KP(I,K6)=7:NEXT I:KP(L6,K6)=2
450 FOR I=1 TO N:K=ABS(((S4-R(I,1))/S3)*62)
460 L=ABS(((R(I,2)-T5)/T3)*62):K6=K/2:L6=L/2
:KP(L6,K6)=1:L=L+140
470 PSET(L,K):NEXT I:INPUT "PRINTOUT";AB
480 IF AB<>"Y" THEN 780
490 LPRINT CHR$(27) "1" CHR$(25):LPRINT
CHR$(27) "P"
500 LPRINT CHR$(27) "C" CHR$(0) CHR$(11)
CHR$(27) "0":LPRINT A:LPRINT B:LPRINT
C:LPRINT
510 LPRINT "VERTICAL " ;S4;" TO ";S5:LPRINT
"HORIZONTAL ";T5;" TO ";T4:LPRINT
514 LPRINT CHR$(27) "1" CHR$(27) "U1"
CHR$(27) "E";

```

FIELD NOTES

```
517 LPRINT CHR$(27) "m" CHR$(4) CHR$(15)
520 FOR I=0 TO 32:FOR J=0 TO 32
530 IF KP(J,I)>0 THEN KS(I)=KS(I)+1
540 NEXT J:NEXT I
550 FOR I=0 TO 32:NC=0:FOR J=0 TO 32
560 IF KP(J,I)<>1 THEN 580
570 LPRINT CHR$(147);:NC=NC+1:GOTO 610
580 IF KP(J,I)=0 THEN 600
590 LPRINT CHR$(126+KP(J,I));:NC=NC+1
:GOTO 610
600 LPRINT " ";
610 IF NC=KS(I) THEN 630
620 NEXT J
630 LPRINT:NEXT I:LPRINT CHR$(27) "1"
CHR$(7)
640 LPRINT CHR$(27) "0" CHR$(27) "U0"
CHR$(27) "F"
650 LPRINT CHR$(27) "m" CHR$(0) CHR$(18)
CHR$(27) "M"
660 ND=N/3:NR=N-ND*3
670 IF NR=0 THEN 700
680 NF(2)=1:NF(3)=NR
700 FOR I=1 TO 10:FOR J=1 TO 3
:NG=I+(J-1)*ND+NF(J)
710 LPRINT TAB(J*25-15);:LPRINT USING
"####";NG;
720 LPRINT TAB(J*25-10);R(NG,1);TAB(J*25-3);
R(NG,2);:NEXT J:LPRINT:NEXT I
730 IF NR=0 THEN 770
740 LPRINT TAB(10);:LPRINT USING "####";
ND+1;:LPRINT TAB(15);R(ND+1,1);TAB(22);
R(ND+1,2);
750 IF NR<2 THEN 770
760 LPRINT TAB(35);:LPRINT USING "####";
2*ND+2;:LPRINT TAB(40);R(2*ND+2,1);
TAB(47);R(2*ND+2,2);
770 LPRINT:LPRINT CHR$(12) CHR$(27) "2";
780 END
```

The following is a typical input file:

Jersey City-PATH Shaft - Bond open; Sub2 Bond Closed
10/23/84 12:32pm
Ca-Bus(V)/Ca-OE(V),1,1
0,.424,-.3,.486,.2,.376,0,.381,.6,.267
.1,.366,-.2,.436,1.5,.101,4.4,.147,0,.386
.3,.392,.4,.304,.1,.377,.2,.356,1.5,.142
.5,.284,.4,.309,.9,.195,2.9,.034,7.2,-.406
1,.215,.5,.272,0,.322,0,.397,-.4,.486
.2,.423,.3,.287,-.4,.518,.6,.331,.4,.383
.4,.386,0,.428,.3,.363,.2,.387,.2,.386

(continued on page 50)

SPELLER 2

Improved Performance,
corrects spelling and
typographical errors of
"Text Do" files.

\$50.00

D SPELLER

Easy to use spelling
checker for use with
disk operating system.
Large vocabulary capacity.

Learns new words.
Comes with a 1,000+
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for loading to disk or
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A fun-to-use expert
system which makes a
psychiatric diagnosis.

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Keeps track of all balances
in multiple checking, savings
and credit card accounts.
Options to find a grand balance
of all accounts and to find
sub-totals for particular items.
Prints checks.

Comes on a cassette or disk.

\$29.00

All programs come on
5 1/4" disk or cassettes
with documentation.

SOFTMATE

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The Model 300 Is Here... You Already Own It!



SUPERA: Like Getting A Whole New Computer

In January 1983, Micro Demon introduced PRO AID. Suddenly Model 100 users found that their computer had capabilities far beyond their expectations. In his InfoWorld review of PRO AID, Reviewer Greg Springer, anticipating the announcement of the Model 200, wrote,

"PRO AID adds enough new capabilities to the current model that the wait for upgraded portability is made much easier and maybe even unnecessary."

Well, the Model 200 is here. But so is SUPERA! SUPERA takes a giant step past PRO AID, and adds a multitude of powerful new features to the Model 100, making it into the computer it was meant to be.

Once it is loaded, SUPERA works transparently to you and your programs. If it weren't for all the wonderful things it does, you would never even know it was there. If you want to remove it, SUPERA is as easy to take out as KILLing a BASIC program.

Unique Format

SUPERA loads and runs as if it were a BASIC program (it's really all machine language). Because of this unique format, SUPERA is compatible with most other software and hardware. It also only requires 4.3K of memory.

With SUPERA installed, every facet of your computer suddenly takes on an aura of new-found power.

In Text

While in TEXT you can

- Use a really fast and flexible search and replace function.
- Turn on a special type-over mode in which typed characters replace text instead of being inserted.
- Read a second file while editing a first.
- Use control keys to delete words and lines, to change the case of the character under the cursor, and to activate the paste key.
- Cause the display to scroll slowly up or down a line at a time.
- Redefine special keys to act as SHIFTed keys, control keys, or graphics characters.
- Turn the computer off without losing your place.
- Access special HELP files.
- Use 26 new macro function keys.

and more!

All of Supera's editing features become available whenever you enter EDIT mode to edit a BASIC program.

Super Function Keys

A great deal of SUPERA's power comes from its 26 macro function keys. These easy to define keys can be used in TEXT, TELCOM and BASIC. Each key generally defines a string of 14 characters, but in both BASIC and TEXT several keys can be concatenated into one so as to provide longer keys. The power of these function keys is hard to imagine until you try them.

In TEXT they can provide you with much more than just easy entry of boiler plate strings. They can also be defined to automatically

cally carry out complicated editing sequences.

In TELCOM these keys can save you money while accessing a data base such as Compuserve. They also save you the trouble of remembering such things as passwords, ID numbers, and special commands.

In BASIC use the keys to enter BASIC commands, and to facilitate typing in programs, to name just a few applications.

Moreover, SUPERA allows you to save and load entire sets of function keys by a single control key action. Thus you might keep a set of keys called TEXKEY.CO handy to use in TEXT, another keyset for BASIC, and yet another for TELCOM.

In BASIC

You get the 26 function keys, and also

- Single stroke access to the built-in software such as TEXT and TELCOM
- Automatic Line Numbers
- Control key activation of selected BASIC commands
- You can redefine special keys

In Menu

You can use control keys to kill and rename files.

Calculator Mode

From BASIC you can enter an entirely new mode called Calculator mode. While in this mode you can quickly and easily evaluate expressions. Calculator mode also provides several new BASIC functions.

Better Than PRO AID

It's true that PRO AID was a significant enhancement to the Model 100, but SUPERA goes far beyond it. In a message on the Compuserve Model 100 SIG, system operator Dave Thomas said,

"Now with SUPERA, the original PRO AID has been enhanced beyond belief... If there is a single, more useful utility on the market for the Model 100 than SUPERA, I haven't heard of it and t'would boggle my mind if t'was!!"

TEX PRO For Word Processing

TEX PRO consists of ALL the TEXT editing features of SUPERA, uses only 2.8K of memory, and sells for just \$49.95. It may be the choice of those who seldom use their Model 100 except for word processing, and don't need all the additional power of SUPERA.

**MICRO
DEMON, INC.**

For more information or to order, write to Micro Demon, Inc., P.O. Box 50162, Columbia, SC 29250. Or call 803-733-0980 anytime. SUPERA \$79.95, TEX PRO \$49.95. Add \$3.00 for shipping. Visa and Mastercard are welcome.

ANALOG-TO-DIGITAL CONVERTERS

Sensatrol

Analog-to-digital converter
Data World Products
P.O. Box 33
Francetown, NH 03043
(603) 588-3746
\$385
Circle No. 141

ADC-1

Remote Measurement Systems
Analog-to-digital converter
2633 Eastlake Ave E Ste 206
Seattle, WA 98102
(206) 328-2255
\$375
Circle No. 142

by CARL OPPEDAH

Sensatrol, from Data World Products, provides easy programming for the measurement and control of real-life systems. ADC-1, from Remote Measurement Systems of Seattle, Washington has more inputs and outputs but is harder to program. Each adds sophisticated data-gathering capability to a laptop or desktop for less than four hundred dollars.

Sensatrol and ADC-1 share many features so they'll be collectively referred to as interfaces. Each allows multiple analog inputs and discrete outputs, and connects to the Tandy 200 or Model 100 through the RS-232 port. The number and type of inputs and outputs are listed in Table one.

Sensatrol has tri-state RS-232 ports. This allows chaining of multiple units. Because each Sensatrol can be assigned a unique identification code, the controlling computer can select which unit to address.

HARDWARE HOOKUP

A computer and interface communicate via an RS-232 cable. The cable provided hooks up directly and it's easy to make extensions. Only four wires are needed: one each for transmitted data, received data, signal ground and safety ground — ordinary four-conductor phone wire works fine. Because the Tandy 200 and Model 100 RS-232 circuitry don't fully conform to the RS-232 standard (generating five volts, not the

standard twelve), shielded cable is needed for longer wire runs.

The interfaces use dual inline package (DIP) switches to set the serial transmission rate, which must be matched to the computer's.

ADC-1 requires battery power or an AC adapter, while Sensatrol uses an AC outlet (but can be modified for battery power). Each consumes a watt or less.

The interface connects to the sensors and control devices through screw-terminal barrier strips. The analog inputs

table one
Sensatrol and ADC-1 Comparison

Model reviewed	ADC-1	Sensatrol
Analog inputs	16	7
Discrete inputs	4	0
Discrete outputs	6	7
BSR output	yes	no
User friendly	no	yes
Price	\$375	\$385

are differential, which makes them more versatile and less susceptible to noise and ground-loop problems.

Sensors connected to the interface can be simple and inexpensive. A photodiode detects light levels, an ordinary silicon diode measures temperature and a few turns of wire detect current.

Each interface comes in a metal box about nine by two by seven inches. On top are about 50 screw terminals for hooking up to analog sensors and control devices. Inside each box is a professionally-masked epoxy printed wiring board containing the integrated circuits and discrete components.

SOFTWARE REQUIREMENTS

BASIC programs control the interface and collect data. The vendor provides sample BASIC programs. The program can store data in a RAM file, display

graphs on the screen or send listings to a printer.

Sensatrol is easier to program: Send a simple four-character ASCII command and receive a four-character response. ADC-1 requires bit manipulation to determine the function selected: analog-to-digital, home alternate-current remote control (BSR) module, or discrete input or output. Further bit manipulation is required to extract the data from the returned data bytes.

ADC-1 has a problem: operations can return a value of 26 decimal (Ctrl-Z). If this happens, BASIC reaches an end-of-file (EOF) condition and subsequent input statements generate errors.

BASIC programmers can trap this by checking the EOF function prior to input: If EOF is true, close and reopen the COM device. Another way to avoid this EOF problem is to input solely from the input port without having OPENed the COM port for INPUT. However, then it's hard to know when a byte has been received because there's no interrupt signal generated.

HIGH-LEVEL READING

Each manual is typewritten with occasional line drawings and tables. Neither has an index, nor are schematic diagrams provided. Both manuals contain most of what an experienced technician or programmer needs to design custom applications, but Sensatrol's is presented more simply. ADC-1's manual lacks a concise description of its DIP switches.

The small size and power requirements of the laptop computer and interface make them ideal for gathering data in remote or dangerous locations. A researcher can leave the data-gathering equipment with battery power within a weatherproof enclosure. The laptop monitors and reports by telephone.

Note: Since the hardware of the Model 100 and Tandy 200 don't allow simultaneous use of the modem and RS-232 connector, no data measurements can be made during a phone call.

Either of these products will do sophisticated measurement, control and data logging. A decade ago, unattended collection of analog data required equipment costing thousands of dollars. □

Text processing power that no other program can equal.



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PCSG says "Send it back in 30 days for a full refund if you don't agree."

WRITE ROM is the definitive word processing extension for the Model 100. Less than two months after the Model 100 was announced Portable Computer Support Group introduced the very first text formatter for the Model 100. That program, called Write + was licensed to Tandy and is now in Radio Shack Computer Centers as Scriptit-100. Write + had many powerful features and most reviewers still say it is the best of the cassette based text formatters. But now eighteen months later PCSG has introduced WRITE ROM. Those who experience it have said "WRITE ROM literally doubles the text processing power of the Model 100."

WRITE ROM is what you would have expected PCSG, the software leader for the Model 100, to develop in the 18 months since Write + was brought to the market.

First of all WRITE ROM as its name implies is on a snap-in ROM. You simply take a quarter and open the little compartment on the back of your Model 100 and press in the ROM cartridge. It is as easy as an Atari game cartridge and can be snapped in and out instantly so that you can use other ROM programs whenever you wish.

WRITE ROM appears on the main menu just like one of your built in programs. It lets you do every formatting function you would expect like setting margins, centering, right justifying and having headers and footers. But it does them under function key control, with the clear and easy to learn and use techniques for which PCSG has become famous.

In keeping with PCSG's long standing reputation for superlatively simple yet comprehensive documentation, the manual is a model of lucidity.

WRITE ROM remembers your favorite format settings so that you can print a document without any set up, but you can change any formatting or printing parameters instantly with a function key.

WRITE ROM's 'pixel mapping' feature shows you an instant picture on the screen of how your printout will look on paper. Incidentally, PCSG introduced this feature on the Olivetti M-10 version of Write + over a year ago.

In all there are 44 separate features and functions that you can do with WRITE ROM, and some of these features are truly breakthroughs for the Model 100.

First, WRITE ROM lets you do search and replace, with function key ease of course. Any word or phrase in a document can be searched for and replaced with any other phrase where the search words appear.

Second, WRITE ROM lets you send any text (formatted or not) to any other computer over the phone with just a function key. What's more, it dials and handles sign on protocol automatically.

Third, WRITE ROM has a wonderful feature called 'Library' that gives your Model 100 power that you never thought it could have. Library lets you record favorite phrases, words, or commonly used expressions (sometimes called boilerplate). Any place you wish any library text to appear in your document you just type in a code. WRITE ROM automatically inserts the text just like a Xerox Memory Writer.

The library phrase is inserted as your document is being printed rather than as it is being typed, so this feature conserves memory in documents where a long phrase is used repetitively, since each occurrence of a library phrase in your document is indicated by a single code character.

This Library feature is so powerful these two pages could be devoted just to telling you about things it can do. For example, you can have names and addresses that you designate in one text file with a customer or supplier number. Or you can have inventory items with stock numbers.

In your document you simply type in the customer or stock number and that entry from the other file is automatically inserted in the document. Picture what you can do with that kind of capability.

Because WRITE ROM is written in machine code, it is blindingly fast. No one can claim faster operation.

Because it is on a ROM it uses virtually none of your precious RAM for its operation, and it does not interfere with other machine code programs in your RAM. It works with any printer, serial or parallel. At the touch of a function key you can find the size of a RAM file in bytes and in words (ideal for journalists and other writers who need to know how many words are in a piece). You can make a duplicate copy of a document file under a new name. You also can rename or delete (kill) any RAM file with function key ease.

This description only scratches the surface of this amazingly powerful piece of software. You can automatically insert the date or the time anywhere in your document; WRITE ROM senses when you are nearing the bottom of a page, and at your command will start a new paragraph on the next page.

Write + was the Model 100 pioneer in the use of 'dot commands' to allow control of such things as margins, centering, line spacing and other appearance related changes in the middle of a document. WRITE ROM goes a step further by making all the dot commands Wordstar compatible. This means that if you wish you can quite easily prepare a Wordstar compatible document. Then you can use features of WRITE ROM (such as pixel mapping) that Wordstar lacks, before uploading to your desktop.

A Mail Merge feature allows you to send the same document to every name on your mailing list, personalized for each recipient.

WRITE ROM enables you to do underlining, boldface and correspondence mode as well as any other font feature that your printer supports in a way that is so unique many users say "It is worth the price of the program just to have this one feature."

Here's how it works: When you want to underline you don't have to remember

some complicated printer code. You just type Graph-U, and to end underline you just type Graph-U again. For boldface it's Graph-B and to end boldface it's Graph-B again. It's easy to remember and easy to do. WRITE ROM lets you record the codes from your printer's manual one time only and then just use these easy to remember signals any time you want to do a printer font feature.

WRITE ROM does so many things that other text formatters cannot do. For example you can not only double space but triple, quadruple or any other.

WRITE ROM allows you to use your TAB key in a document so that you can indent the first line for a paragraph easily or space rapidly over many tab stops.

WRITE ROM has another nice feature. It allows you to indent. This means that you can have paragraphs that have a first line that projects to the left of the remainder of the paragraph.

WRITE ROM allows you to not only center a word or phrase on a line but you can center copy vertically on a page as well.

WRITE ROM has a feature that is unique to any word processor on any computer. It is called FORM. FORM is an interactive mechanism that lets you create screen prompts so that you or someone else can answer them to fill out forms, or supply information like to a questionnaire or answer correspondence rapidly inserting personal answers into a form letter.

It works sort of backwards from Library or boilerplate. As you recall, with the Library feature you type a code into a document and when you print, that phrase or word or paragraph is picked up from the Library file and inserted into the printed document. With FORM when you print, anyplace where you had previously typed in a GRAPH T in a document, the printer will stop and you are shown a prompt on the screen. You can type in directly on the screen and when you press ESC, what you typed is sent to the printer formatted like the rest of the document.

What is really great is that you created those prompts that appeared on the screen. By the way, the prompts won't appear in the printed document unless you want them to, and you don't have to be connected to a printer, you can write your completed forms to RAM files if you wish.

Think of how you can use FORM. A doctor or nurse could use it for a patient's history with each question appearing on the screen. An insurance salesman could have

his entire questionnaire, or a police department could do a complete arrest report. You can construct a series of prompts to answer correspondence, automatically inserting the answers into a generalized letter format for a given type of correspondence, like customer service. This feature lets you answer letters in a rapid fire fashion each one with its personalized responses.

Before WRITE ROM you had to be a programmer to create a series of prompts to answer questions or record information. Now it is as simple as typing Graph T.

There are many other examples of excellent programming evident in WRITE ROM. The line feed problem of the Model 100 is dealt with by the simple use of a function key. Files are selected by moving the wide bar cursor over the WRITE ROM menu.

PCSG makes the claim that WRITE ROM is the easiest, fastest and most feature rich text formatter for the Model 100, as well as being the only one on a Snap-in ROM. You can do more with WRITE ROM than anyone thought possible for the Model 100. We at PCSG are happy to offer WRITE ROM because it expands the Model 100 to a dimension of text processing you cannot equal on even larger computers.

If you are already a PCSG customer you know the impressive quality of PCSG craftsmanship. We brashly state that WRITE ROM is the best you can buy. But don't take our word for it. It is sold on a thirty day trial. If you aren't as excited as we are, return it within 30 days for a full refund. Priced at \$149.95, on Snap-on ROM. Mastercard, Visa or COD.

PORTABLE COMPUTER SUPPORT GROUP

11035 HARRY HINES BLVD. No. 207
DALLAS, TEXAS 75229

PCSG provides hotline software support for Model-100. Call 1-214-351-0564. Available now directly from Portable Computer Support Group. We endeavor to continue as The Leader in Software for the Model 100.

END TRANSMISSION

Under the gun again. When the editors of Portable 100/200 invited me to join in the celebration of the magazine's second anniversary, I agreed. Then I was told the column was needed within 24 hours. Some things never change.

It has been a long, strange two years and I've slowed down some. Portable 100's first managing editor, John Mello, used to call me (my office was upstairs and his downstairs) once a month. The severity of the threat was implied in his voice by the depth of his growl: "Where's End Transmission, Kerry?"

If it was press day I didn't dare ask for a topic suggestion. End Transmission, you understand, was Portable 100's editorial page. Deadline was 4:30 when Rick of Federal Express came by.

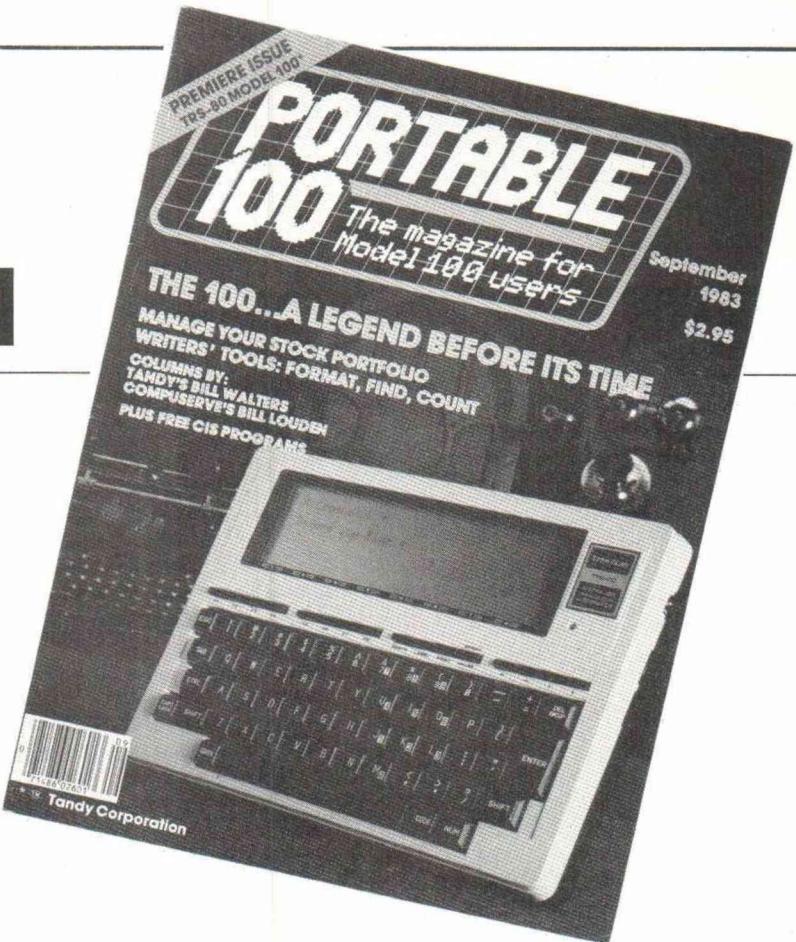
If John was feeling particularly rotten he wouldn't call me until late morning which was in time to ruin my lunch and barely time enough to think up, write, typeset, proofread and paste up something worth publishing . . . or close to publishing. I sometimes wake up nights to the memory of Mello trying to shake another End Transmission out of me.

There was plenty to say. The Model 100 was in a class by itself. Everyone who saw it shamelessly ooh-ed and ahhh-ed. I used to unveil my machine on airplanes just to draw a crowd. But time is life's grand eraser. We quickly forgot that it was only two years ago when people were blown away at the thought of fitting a whole computer into a briefcase. There was plenty to say but so little time to slow down and say it.

And now Editor J.D. Hildebrand has given me 24 hours; damned generous of him. He said I didn't have to write on a topic, just reminisce. Let's do a topic anyway. I have great respect for paper and agree with John Mello's opening remarks in the premiere issue of Portable 100: "I don't like wasted paper."

ADVANCING TECHNOLOGY

The Model 100 was the world's first usable briefcase computer. It was a brilliant piece of work. The people at Tandy who supported the machine and helped bring it to market were visionaries. Of course expected profits served as a moti-



The founding editor of Color Computer and Portable 100/200 (back in its Model 100-only days), Kerry Leichtman is a familiar character in Camden, Maine. Since retiring from Portable 100/200 he's taken on a career as a farmer — he and his wife Caron raise chickens, pigs and sheep at the Leichtman ranch just outside town. In his spare time Kerry works for computer-publishing giant Ziff-Davis in a one-man office overlooking Camden Harbor.

vation but so did the thrill of breaking new ground in an increasingly competitive field.

Apple computers, at least in its original management, strove to excite as well as profit from computer technology. You won't see fun induce IBM to introduce a product. Anyone thinking, "Yeah, but they're making truckloads of money," slap yourselves across the head. There's more to life, folks, than making gobs and gobs of money.

Don't misunderstand me. I don't dislike IBM because they make so much money. I dislike IBM because they stagnate whatever pool they enter. They don't dive into a pool of opportunity bravely seeking new wonders. They wade in and send others ahead watching carefully, always smiling and asking: "How's the water?" And when there are enough bodies in the water to raise its temperature to the right level, they venture in.

And they come in by droves until there's no room for anyone else. And

when the next crowd of people wants to come in, they say: "Welcome to our pool. This is how we want you to swim."

LEGITIMACY 1.0

That is marketing might and business savvy and who am I to disagree with such strength and success? I know that when I was an editor with 80 Microcomputing magazine, years before the IBM PC, a flight simulator program cost \$25, a word processor \$80 and a data-base manager less than \$100. People were buying computers like crazy. Prices were low and excitement was high.

Into the midst of this excitement came the IBM PC. The press (the non-computer press) made ridiculous statements like, "IBM Legitimizes Microcomputer Industry with Powerful Business Machine."

IBM played it smart. They learned from Apple that to attract quality programmers they should encourage programmers and entrepreneurs and they

(continued on page 63)

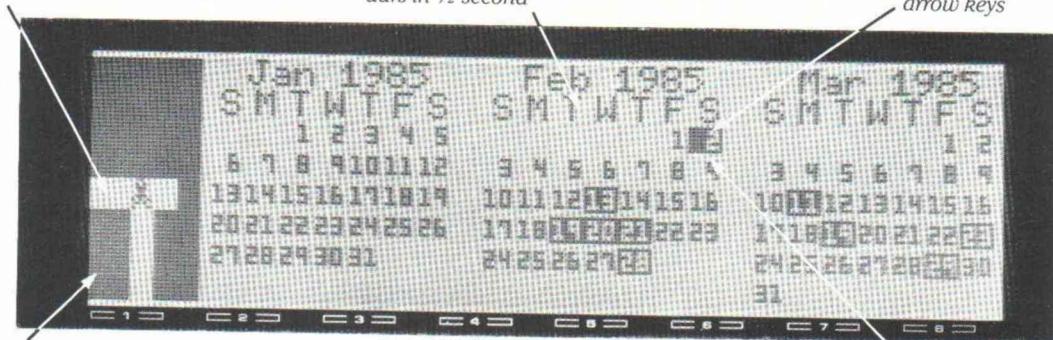
"It's about time someone wrote this software."

We've done it with TMPC (The Most Precious Commodity)

Exclusive *Floor Plan interface

Fast machine language program displays calendars in 1/2 second

Current day flashes, and can be changed with arrow keys



Fourteen other screens handle projects, print diaries, and monitor files

Appointments for indicated day displayed with a single keystroke

Your TRS-80 Model 100 probably saves you time already. So why not use it to *manage* your time? The **TMPC** software from Acroatix transforms your Model 100 into a command center for appointments and projects.

More than a Calendar

Your Model 100 deserves more than a simple-minded replacement of a date book. The **TMPC** is designed around principles from Stephanie Winston's *The Organized Executive*, a popular self-improvement guide for anyone who wants to be better organized. Every **TMPC** feature has been carefully designed and tested to work for you.

Interested? Ask for our free demonstration program today. If you have a modem cable, we will send it over the phone (see the box); the call takes about five minutes. Otherwise, send us \$3.00 for handling and we'll send a cassette with the sample. Discover the old-fashioned value in **TMPC's** space age design, and you'll agree that, "It's about time someone wrote this software."

TMPC by Acroatix
\$49.95 + \$3.00 shipping
Phone orders call

(800) 225-5800



COD orders accepted

AUTO LOG-ON PROGRAM FOR:

Free Sample

```

10 P$="16176575422"
15 P$=P$+"< = ^D^D?1tmpc ^M?S>"
20 M=VARPTR (P$)
30 A=PEEK (M+1)+256*PEEK (M+2)
40 CALL 21200
50 CALL 21293, 0, A
60 LOAD"MDM: 8N1D", R

```

Note: Before running this program, connect your Model 100 to a telephone with the Radio Shack modem cable (see page 76 of the owners manual). Set TELCOM status to M8N1D.

Massachusetts residents must remove the area code in line 10.

Ac'ro·a'tix Incorporated
P.O. Box 273 Wilmington, MA 01887





Easy as ADC

A Universe of Real-World Applications

BY JERRY HOUSTON

Leaves drooped. Flowers wilted. In just a few short hours the malfunctioning ventilation system would cause the loss of thousands of plants and dollars to the florist.

A horrific noise pierced the hot and humid stillness as fans and refrigeration units recommenced their whine. A Model 100 had sounded the alarm, alerting the off-site greenhouse operator to the systems breakdown. His quick response time and flick of the appropriate switches restored order.

Real-world data acquisition and control projects are among the most interesting uses for computers. Thanks to a new breed of computer peripheral, the user no longer needs to be an electronics engineer to put real-world power into his/her computer. Individuals are using laptop computers and analog/digital data acquisition and control systems (ADCs) in the home and in the field.

An ADC lets a computer *talk* to other devices within its physical environment, and many ADCs allow the computer to control equipment as a result of programming decisions. When the computer talks to a temperature sensor, it finds out how hot it is and turns on an air-conditioner. If it talks to a soil-moisture sensor, it determines whether the lawn needs watering and turns on the sprinkler system. *Real computing* is an ADC providing real-world data to a computer, enabling the machine to control other devices in its physical environment.

**AT LAST,
WORD PROCESSING
THAT WON'T
COME UP SHORT.**

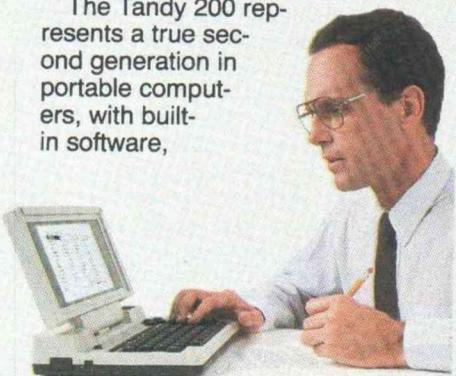


The Tandy 200 communicates ideas better.

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The Tandy 200 represents a true second generation in portable computers, with built-in software,



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Improved Word Processing Software

An improved version of the Model 100's easy-to-use word processing program makes the Tandy 200 especially useful for journalists, salespeople, engineers, students and anyone who needs to write letter-perfect memos, reports and correspondence in a hurry. Edit, delete and move blocks of text with just the touch of a function key. It's that easy. The Tandy 200 gives you the convenience of a personal word processor for use anytime, anywhere for notes.

Four other "instant-on" programs let you use the Tandy 200 as your personal appointment calendar, address and phone directory, and telephone auto-dialer (the Tandy 200

generates tone dialing pulses, so you can use it with long-distance services). A much more powerful built-in program for communications makes it easy to access other computers by phone. You can even create your own programs in the BASIC language, too.

A Bigger Screen and a Larger Memory

The Tandy 200's high-contrast flip-up liquid crystal display has 240 x 128 resolution for big, clear graphics and easy-to-read characters. The 16-line by 40-character display makes the Tandy 200 particularly well suited to word processing and spreadsheet duties and with simple BASIC commands you can add dot-addressable graphics to your text.

To get the most from the Tandy 200's powerful new capabilities, we increased the standard memory size to more than 24,000 characters. Additional banks of 24K modules let you increase the memory up to 72K.



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Most of today's computers, desktops and laptops, are digital. They can deal only with information presented in digital form and under two conditions: on or off. Since computer thinking is done electronically, it takes many digits to represent a value in binary (on-off) numbers.

Operating in a digital mode, a computer deals directly with digital information. Aside from providing appropriate safe voltages, not much interfacing is required for a laptop to tell whether a circuit is open or closed. But many important parameters aren't answerable by yes-no/on-off digital conditions. *Analog* measurements are required.

If the current room temperature is 20 degrees C (about 68 F), the temperature is 20 percent of the way between the point where water freezes and boils. An analogy between the current room temperature and two other temperatures is made and can be related to observable physical phenomena. Analog values exist along a scale and provide a *how much* kind of answer.

In the field, computers often gather data in analog form, converting it to a digital readout. An ADC system makes the conversion.

Analog measurements only make sense relative to a specific scale, and when points along that scale can be related to a familiar object or event through analogy. Analog values have special meaning to a computer used for control purposes.

DIGITIZING HARDWARE

The process of converting analog values to digital values that the computer understands is called A/D conversion, or digitizing. It can be accomplished in a number of ways, but two are commonly used: successive approximation and dual-slope integration.

Successive approximation is accomplished much the same way a program to extract cube roots of numbers is coded. If number four were entered on the Model 100, the user would then experiment with multiplying other numbers times themselves three times until the answer was close to four. If the response went above four, the number being cubed would be lowered. If a value less than four was the result, the number being cubed would be raised. Each answer would be tested against four until an approximation within pre-set ac-

curacy limits was reached. The conclusion would be the last number cubed was approximately the cube root of four.

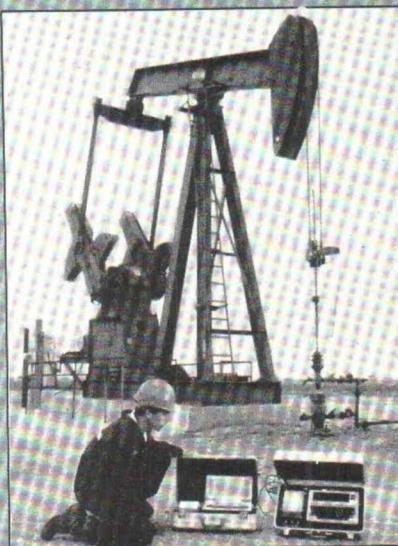
Dual-slope integration is similar to determining how full a bucket is by measuring the time it takes to empty it at a known flow rate. If it takes 30 seconds to empty a full gallon of water from the bucket, then it'd be safe to conclude a half-gallon of water would empty in 15 seconds.

In either case, the A/D convertor translates an analog voltage into a digital number the computer understands. All sensors used for analog measurements with computers must have an output that is — or can be converted to — a voltage.

Resolution is a term used to express an ADC's sensitivity. Since the analog values are produced by and for computer chips, resolution is usually measured in terms of bits. Resolution is the ability of the instrument to discriminate between one value and the next, or, how far apart the units are on the analog scale.

The size of those units can be determined by dividing the overall range measured by the ADC by the number of increments it can deal with. The number of increments is determined by tak-

Taking the 100 to the Well: It's **DYNO-MITE!**



It all started with the dinosaurs and their contemporaries — sea slugs, trilobites, ferns, stuff like that.

With the possible exception (some say) of a small colony at Loch Ness, they all died. Some fossilized and turned to stone. Others — a surprisingly large number — turned through some arcane geological process into the raw materials that upon refinement become oil and natural gas.

That's why petroleum products are called *fossil fuels*.

PUMPING THE FUTURE

In relatively modern times, man has discovered that fossil fuels may be pumped out of the ground and into tankers for dispatch to refineries, distribution centers, resellers and retail customers. This lucrative process has

spawned an entire industry whose players are the world's largest corporations: Exxon, Gulf, Chevron, Shell, Atlantic Richfield and the like.

These companies operate on a grand scale, earning more in a day than some small countries spend in a year. The industry employs millions of workers at well sites, refineries, administrative offices, sales headquarters and service stations. Make no mistake: This is big, big business.

It's so big, in fact, that a one or two percent improvement in efficiency at any step in the chain can be worth megabucks to the parent corporation or the small companies supporting it.

That's where Nabla Corp. of Midland, Texas steps in. Under the leadership of two engineers who formerly worked for Shell Oil, the company has broken new

REAL WORLD

ing the number two to the power of the number of bits, since each bit by itself can express only the two conditions of on or off.

Many ADCs, especially less expensive ones, are designed for eight-bit resolution. They divide their measurable range into 256 increments. Twelve-bit ADCs are readily available too, and the difference is dramatic - since each additional bit of resolution doubles the number of increments, 12-bit devices are capable of splitting the measured range into 4,096 increments. Sixteen-bit ADCs are far less common, and are capable of dividing a measured range into 65,536 steps.

From an applications point of view, the important considerations are: resolution, speed and cost. Eight-bit A/D conversion is faster. Table one lists some ADC equipment suppliers.

Laptop computerists use ADC systems constructed with CMOS components, battery-powered for portable use. A sophisticated self-contained data acquisition and control system can be kept in a small briefcase for on-site use.

IN THE REAL WORLD

Some of the most interesting real-

world applications for the laptop computers are projects taking advantage of their portability. A Tandy portable or NEC PC-8201A coupled with an ADC computes statistics, writes data files to disk, prints permanent reports and serves as a warning system. Here are some examples:

- To study the affects of temperature changes on the mating behavior of the Sierra Sage Grouse, a University of California professor is using an ADC and a Model 100 to monitor environmental conditions. Sensors for wind speed and light intensity measure airflow cooling and solar heating, while thermocouples measure air and ground temperatures. A thermocouple inserted in a grouse is used to measure the insulating effect of the bird's feathers. This research is being conducted in the Sierra Nevada Mountains.

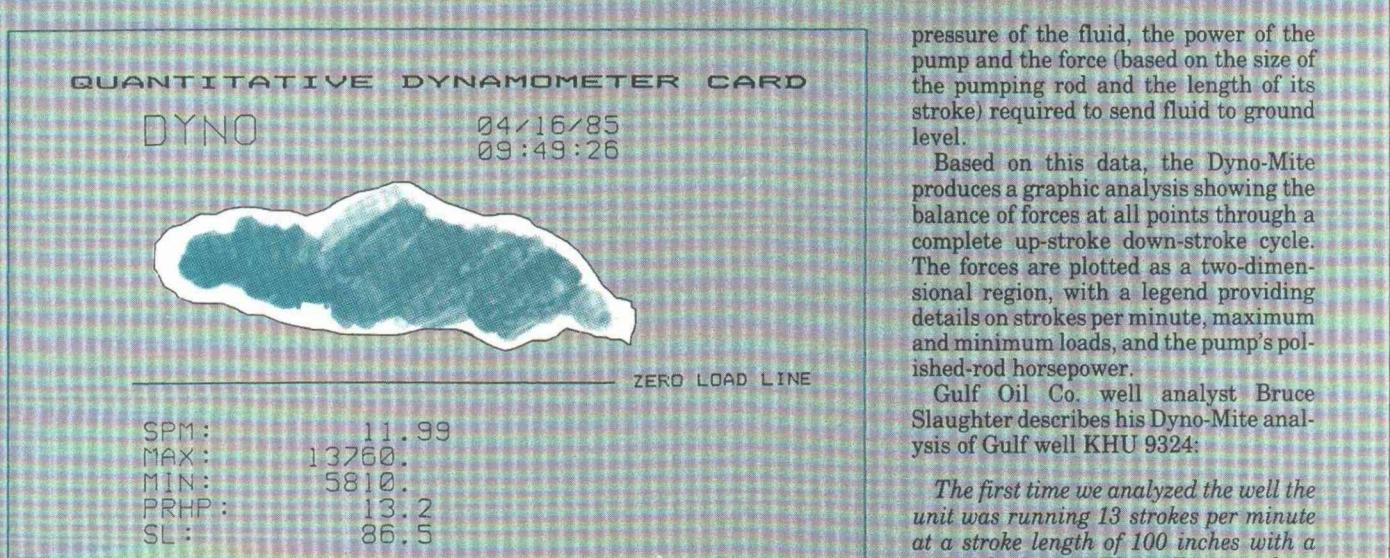
- Researchers in Norway chose the 100 to study the formation of patterned ground in arctic permafrost regions. It monitors strain gauges and temperature sensors buried in the soil. Four systems have been deployed near Spitzbergen to record stresses and soil motion

resulting from the annual freeze-thaw cycle. The soil surface is marked by a distinct pattern of stone circles thought to result from the slow overturning of the soil in a convection-cell manner. The systems are battery-powered and were cold-room tested to -40 C before field installation. (A description of the research can be found in *Science News*, January 1985.)

- The effects of sanitary landfills on air quality is an important political topic in many areas and is being investigated in Washington State by researchers using the NEC equipped with ADCs. Battery-powered sampling stations are located upwind and downwind of the landfills, and air speed and direction sensors are monitored so sampling pumps can be turned on when conditions are right. The computer and ADC provide convenient automation for an otherwise boring and expensive process.

- The changes in body weight of sea gulls throughout the breeding season was the objective of a University of Washington researcher studying their energetics and nutritional requirements. He used an ADC to digitize the

(continued on page 41)



Dynamometer samples 90 pairs of load/position points at equal time increments, then saves them for generated dyno card as illustrated above.

ground in the application of low-cost microcomputers to oil drilling. A key component of Nabla's well-site analysis package is a digital dynamometer based on Radio Shack's TRS-80 Model 100.

The 100 fits into an aluminum briefcase with a portable graphics printer and some Nabla-designed circuitry, and interfaces via an analog/digital con-

verter (ADC) to a pair of position transducers on the pump. The Dyno-Mite costs about \$12,500.

GRAPHING DYNAMICS

Dynamometers measure force or power. The Dyno-Mite measures all the forces involved in pumping oil from underground reservoirs to the surface; the

pressure of the fluid, the power of the pump and the force (based on the size of the pumping rod and the length of its stroke) required to send fluid to ground level.

Based on this data, the Dyno-Mite produces a graphic analysis showing the balance of forces at all points through a complete up-stroke down-stroke cycle. The forces are plotted as a two-dimensional region, with a legend providing details on strokes per minute, maximum and minimum loads, and the pump's polished-rod horsepower.

Gulf Oil Co. well analyst Bruce Slaughter describes his Dyno-Mite analysis of Gulf well KHU 9324:

The first time we analyzed the well the unit was running 13 strokes per minute at a stroke length of 100 inches with a two-inch plunger. The well was making 33 bbls total fluid. The unit was 113 percent loaded, the gearbox was 197 percent loaded, the rods were 180 to 182 percent loaded and the minimum horsepower demand was 47 hp on a 40 hp motor.

We slowed the unit to seven strokes per minute and shortened the stroke to 84 inches. We changed the pump to a 1.25-inch plunger. The well is still making 32 bbls total fluid on cycle. The unit is now 69 percent loaded, the rods are 85 to 86

(continued on page 62)

Plotting Portables

Model 100 and NEC PC-8201A owners can run this program for accessing information from analog inputs of an ADC device. The data is displayed in graphics using the 200 by 50 pixel high-resolution capabilities of both laptops. The listing is written for the 100, with later instructions for NEC users.

As pointed out in the accompanying article, application programs designed for data acquisition and control work should be written to include subroutines of the actual code used. Then the programmer can ignore the coding needed to access that data and call the subroutine when needed. Such subroutines, once coded and tested, should be stored separately for inclusion in future applications.

The subroutine at line 5000 acquires data from a device called the ADC-1 Data Acquisition and Control System by Remote Measurement Systems in Seattle, Washington. The program will plot temperatures to the screen in degrees Fahrenheit when used with the ADC-1 and the AD590 temperature sensor from Analog Devices.

The source code is well-commented for clarity, but memory space can be saved by leaving them out. Don't type in the blank lines separating sections of the listing, but do remember to type any final semicolons (;) following PRINT statements.

First, lines which can be changed to use this data plotter for other purposes will be illustrated. Second, lines needed to be rewritten for the NEC will be shown.

Line 40 assigns a channel number for use by the ADC-1. This can be left out unless a similar ADC requires the assignment. After going to the subroutine at line 5000 for analog data, the value showing up in variable Z will be tenths of millivolts (.0001 V) read from that channel. This value is specific to the ADC-1 device, and it is converted to degrees Fahrenheit in line 80. For any other data to be plotted, return from 5000 with the needed value in Z. When the value is printed to the screen in line 90, print Z.

Similarly, replace variable DF (degrees Fahrenheit) in line 130 with Z. This makes the vertical plotting position dependent on the value of Z. Otherwise, the program will work fine and should be very useful for general-purpose high-resolution graph output.

—J.H.

```

1 REM Program to read and plot data from an ADC-1 Analog Input.
2 REM for Radio Shack Model 100 - plot resolution 200 X 50
3 REM by Keith Ronholm, Remote Measurement Systems
5 OPEN "COM:88N2D" FOR INPUT AS 1 ;set baud rate, bits/byte
10 PN=192 ;serial port address
12 PA=100: PI=60 ;set initial plot limits
20 CLS ;clear screen
21 LINE (38,12)-(239,62),1,B ;draw plot axis block
22 PRINT @41, PS: PRINT @21, PI; ;print min and max labels
23 PX = 38 ;horiz position of first point
25 PD=(PA-PI)/50 ;vertical plotting increment
30 PRINT @10,"TEMP="; ;print each channel label
40 CN=7 ;set for ADC-1 channel 8
50 GOSUB 5000 ;get analog value
80 DF=(1.8*((Z/10)-273))+32 ;change to degrees F
90 PRINT @16, DF; ;print sample value
95 PRINT @32, TIMES ;print time in upper RH corner
100 PX=PX + 1 ;move one point right on the plot
110 IF PX>239 THEN PX=39 ;if RH side, restart from LH side
130 PY=62-(DF-PI)/PD ;convert sample to screen coordinates
135 IF PY>63 THEN PY=63 ;don't exceed upper plot limit
136 IF PY<12 THEN PY=12 ;don't exceed lower plot limit
140 PSET (PX,PY) ;plot current point
200 A$ = INKEY$ ;check for keyboard inputs
210 IF A$="S" THEN GOTO 600 ;if S then change plot scale
220 IF A$="R" THEN GOTO 20 ;if R then restart program
500 GOTO 50 ;go get next point
600 PRINT @ 130, " " ;set position for input
610 INPUT "Enter Minimum Value - ";PI ;get new lower limit
620 INPUT "Enter Maximum Value - ";PA ;get new upper limit
620 GOTO 20 ;clear screen and start plot
5000 OUT PN,CN ;select A/D channel, start digitizing
5010 GOSUB 5200 ;wait for response from ADC-1
5020 OUT PN,161 ;request high byte of data
5030 GOSUB 5200 ;get answer from ADC-1
5040 HB=CH ;store high byte
5050 IF (HB AND 128)<>0 THEN 5020 ;check for digitizing not done yet
5060 OUT PN,145 ;if done, request low byte of data
5070 GOSUB 5200 ;get answer from ADC-1
5080 LB=CH ;store low byte
5085 HM=HB AND 15 ;mask for 4 data bits in high byte
5090 Z=LB + 256*HM ;combine into 12-bit data
5100 IF (HB AND 16) =0 THEN Z=-Z ;change sign if negative bit set
5110 RETURN ;done
5200 FOR DE=1 TO 25: NEXT ;short delay
5210 CH = INP(PN) ;get ADC-1 response from RS-232 port
5220 RETURN ;done

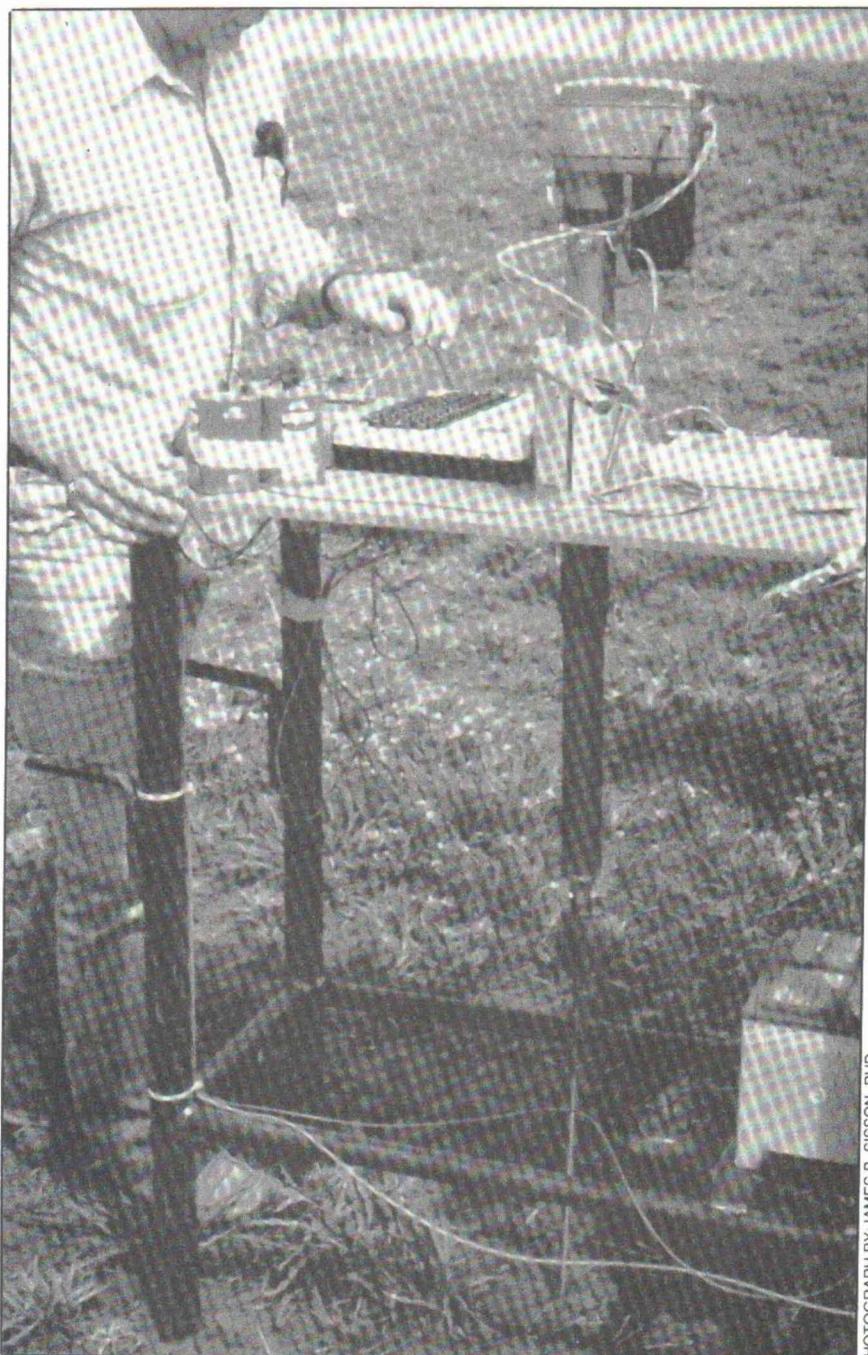
```

For NEC users, make the following line changes:

```

5 OPEN "COM:8N82NN" FOR INPUT AS 1
15 SCREEN 0,0
21 FOR K=12 TO 62: PSET(38,K): PSET(239,K): NEXT
22 FOR K=38 TO 239: PSET(K,12): PSET(K,62): NEXT
23 LOCATE 1,1: PRINT PA: LOCATE 1,7: PRINT PI;
24 PX=38
30 LOCATE 10,0: PRINT "TEMP=";
90 LOCATE 16,0: PRINT DF;
95 LOCATE 32,0: PRINT TIMES;
600 LOCATE 10,3: PRINT " "

```



Kansas State University researcher uses a Model 100/analog-to-digital converter unit to monitor soil permeability.

output from a home-built strain-gauge platform balance. The ADC was controlled by a NEC, performing balance calibrations and recording weights. The system was battery-powered and located in a marine environment. Code was written to recalibrate the scale automatically when droppings were left behind.

ADC PROGRAMMING

Though most of these applications sound *hi-tech*, keep in mind that the developers of the projects in most cases aren't computer professionals but people with knowledge of laptops.

Since the majority of ADCs respond to single-byte commands sent to the RS-

232 port, BASIC understanding isn't necessary.

Accomplishing real computing with a laptop requires no more than providing subroutines to access the various functions of the ADC, then calling them from a processing program when needed. Usually the manufacturer of the ADC helps out, providing printed coding as an example and demonstration software custom designed.

Once the subroutines can read an analog channel, turn on a controlled output or operate whatever other features that unit includes, coding an application program is mostly a matter of coding a proper sequence of IF . . . THEN decisions.

Returning for a moment to the greenhouse example, here's how a program might look in simplified pseudoBASIC:

```
PERFORM HOUSEKEEPING (open
RS-232 channel, set baud rate, etc.)
CHANNEL = (analog channel for temperature)
GOSUB (analog-read subroutine)
IF TEMP > 30 AND TEMP <= 35
THEN
OUTPUT = 1 (select output controlling
fan)
GOSUB (turn on selected controlled output)
IF TEMP > 35 and TEMP <= 40 THEN
OUTPUT = 2 (select output controlling
A/C equipment)
GOSUB (turn on selected controlled output)
IF TEMP > 40 THEN
OUTPUT = 3 (select output controlling
alarm)
GOSUB (turn ON selected controlled output)
GTO (analog-channel read, and repeat
process from the beginning)
```

This is simplified for clarity. More experienced readers will spot some ways to use compound conditions to reduce the number of comparisons made, and speed operation. To turn off any of this equipment as the temperature falls, the same procedures would be followed.

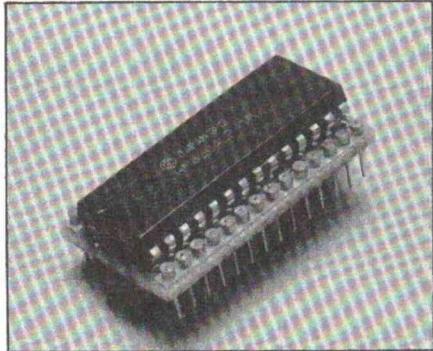
What could your Tandy portable or NEC do on the homefront if it could communicate with the real world?

It could control temperatures. Soil moisture sensors are available that can be checked to see how dry the lawn is. If it's dry enough, AND it's an appropriate time of day, AND it's not raining, your computer can turn on the sprinkler system. An inexpensive light sensor could pick up a car's headlights, and turn on outside lights when someone ap-

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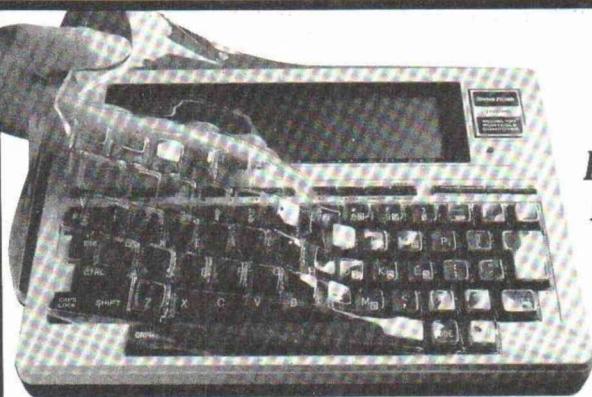
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REAL WORLD

proaches the garage at night.

Since laptops make time-of-day so easy to monitor, the computer easily can turn devices on or off at preset times. It's not hard to program a computer to warm up the bathroom in the morning, start the coffee maker and turn on the stereo.

How about a safety-and-security monitoring system? Most ADCs include digital inputs, as well as analog. They can be used to tell whether a switch has been opened or closed. If a vibration sensor indicates someone trying to get into a back window, a light pattern can be turned on to simulate someone approaching. If attempts to enter succeed, that would be the time to set off a loud alarm or have an automatic dialer call the police.

EQUIPMENT AVAILABILITY

Analog/digital data acquisition and control systems are manufactured by many companies. Some overlap in terms of price and capability, and thus are competitive with each other. In other cases, a manufacturer will address a particular market and specialize in alternatives.

Consider all parameters affecting a proposed application and select an ADC to satisfy them without expensive overkill. If a \$200 ADC more than handles requirements, don't spend \$1,000 on one that has twice as many features and works four times faster. On the other hand, technical considerations may dictate a higher degree of capability, especially for commercial applications.

Finally, consider whether a proposal will benefit by maintaining the computer's portability and independence from AC power requirements. Some very sophisticated ADCs are built with the same CMOS technology used in laptops and draw only 20 milliamps (MA) or so during operation. That makes them perfect companions for computers acquiring data away from ordinary power sources, or for applications requiring system transporting from site to site. □

Jerry Houston is an independent programmer for engineering companies using real-world applications. He also works as marketing director for Remote Measurement Systems Inc. Seattle, Washington and teaches data processing. —Ed.

Please help us rate this article's value. If you've found it very valuable, circle 170 on the reader service card. If it was moderately valuable, circle 171—and if it wasn't valuable to you, circle 172.

REAL WORLD

Remote Control

The BSR X-10 remote control modules simplify wireless remote control of household or commercial devices.

The market is split domestically, with BSR handling the consumer segment and Leviton supplying industrial-grade services. Technology is licensed from a Scottish company, thus providing standardization for control codes used.

The most familiar BSR modules are small plastic boxes containing an AC plug and socket. They're plugged into an outlet with the device to be controlled plugged into the module. Each contains a relay and the ability to respond to a series of commands sent via existing AC wiring.

BSR modules cost about 20 dollars each. They're sold in appliance, department, discount and electronics stores.

BSR controllers send radio-frequency control signals over the wiring. Each module can be set to respond to a unique address, expressed as a *house code* (A - P) and a *unit number* (1 - 16). When a module receives its number, it listens for a command. Possibilities include on-off for appliance modules (mechanical relays), and brighten-dim for lamp modules (electronic relays).

Power companies' transformers stop the control signals, and a variety of house codes assures that a neighbor won't shut off your stereo instead of his floodlight.

With portables, an OPEN AS COM1 statement is used to assign the RS-232 communication parameters such as bps rate, word length, stop bits and parity. Thereafter, only the OUT command is required to send command characters to the ADC.

Modules don't interfere with normal operation of devices and can be overridden by them. For example, if a lamp is connected to a BSR module, it's possible to manually turn on the lamp.

Some manufacturers of ADC systems build transmitters into their products. Those ADCs feature transmitters sending BSR device addresses and control codes over AC wiring.

The BSR transmitter sends a stream of bits when the voltage on the line is near zero (as it crosses from positive to negative or vice-versa). Commands are sent normally, then inverted, and the process takes about one-third of a second to complete. The ADC provides the driving logic, making it simple to control such devices from a program. — J.H.

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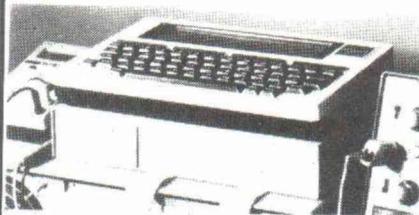
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by WOODY LISWOOD

How can two products implemented so differently still accomplish the same purpose? A comparative look at Portable Computer Support Group's 64-kilobyte random-access memory expansion module (manufactured by Crytronics) and PG Design Electronics' 64K RAM expansion module reveals that both succeed — dissimilarly.

Both work. When either one is inserted into the Model 100, a 96K RAM laptop is born — three 32K computers in one. Each 32K bank of memory acts as if it were a complete, separate Model 100.

Software accompanies each 64K RAM expansion module allowing the user to switch between banks. PG Design's unit comes with software already loaded in both new banks, although the user must load the menu program into the original Model 100 bank from a cassette. PCSG's RAM Plus software comes on a read-only memory (ROM) chip. After the expansion module is inserted, the chip accesses all banks.

The Model 100's ROM chip holder in the bottom of the machine secures either vendor's module. Batteries are needed to keep data in the RAM banks intact when the RAM module is removed from the 100. Here's the first real difference between the products.

BATTERY VARIANCE

PG Design's RAM expansion module contains an easy-to-replace CR 1220 3V lithium battery. PCSG's has batteries

permanently attached to its bank, not replaceable by the user. The documentation doesn't indicate battery type or how to replace them. It does provide a warning: Be careful when inserting batteries into the Model 100 cavity to prevent damaging the plastic covering.

No one would ever confuse the two modules. Physically they're as different as night and day. PG Design's contains a tiny nicad (nickel-cadmium) rechargeable battery in a holder as part of the unit. PCSG's batteries are attached by two wires hanging from the module. The batteries are tucked underneath the module, next to the ROM socket. Both products have extra wires soldered to them, an indication that evolution may still be occurring.

I have put together many electronic kits and have attacked various computers with soldering iron and wire. What's been learned from these experiences is the importance of design neatness and wiring. If this theory holds true for RAM expansion modules, the PG Design unit wins hands down.

The PG Design module also comes with straps so it can be inserted and removed easily from the 100. PCSG's has no straps. To remove the board requires a small flat-blade screw.

Accessing different 32K sections of RAM, called bank switching, can be risky business. I experimented by taking out both RAM banks. Some problems arose, however, when replacing PCSG's RAM Plus chip.

The original PCSG review chip erased the entire RAM bank when switched from DISK Plus (see Terry Kepner's review, Portable 100, August 1984, pg. 71) on the menu to RAM Plus for the RAM bank. A phone call to PCSG and a talk with their programmers got me a new chip. The problem seems to have disappeared. However, it's still possible to erase all of bank one when changing ROMs.

Both expansion boards work with Radio Shack's Disk/Video Interface. The PG Design unit includes a new 40-pin connector. PCSG's offers a pass-through connector exactly the same as the connector on the Model 100.

The striking difference between the

two products is the way each manages RAM banks. PG Design's supplies a 4K software program installed in each bank. PCSG's manager is found in the RAM Plus chip inserted into the 100's ROM socket.

PG DESIGN LOADED SOFTWARE

The PG Design expansion module is equipped with software loaded into the second and third banks. The program is loaded from cassette into the original Model 100 RAM called bank one. Documentation contains a short one-line BASIC program for bank switching if the menu program isn't used.

This unit also contains a memory-test program in each bank to make sure the chips are working. Deleting the test program after use gains extra space.

The accompanying INVISO.BA program makes the menu program visible or invisible. According to the documentation, the MENU.BA program to run the banks must be the first BASIC (.BA) program in memory. Any other .BA file must be deleted or renamed before loading MENU.BA. Since MENU.BA permanently changes memory hooks, be careful not to accidentally erase it.

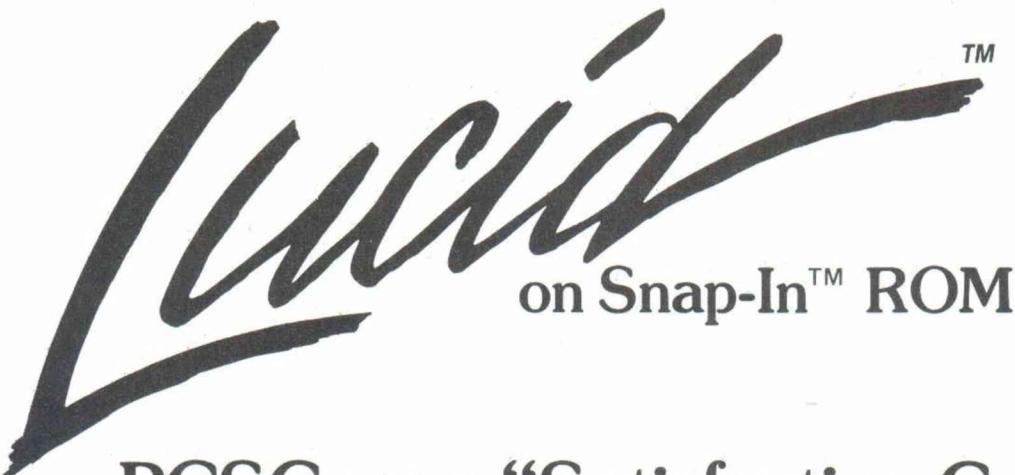
The INVISO.BA program actually renames MENU.BA to OMENU.BA, making it invisible on the main menu. To run the program, type OMENU at the main menu.

After running the program, the 100's standard menu appears with new function key assignments and two new numbers at the top right of the screen. The first number shows the byte size of the file under the wide-bar cursor. The second number tells the current bank.

The only problem encountered with PG Design's product was that MENU1, the program for bank one, wasn't on the cassette tape the company sent. Calling the company resulted in a solution: Load one of the menu programs from bank two to cassette, reload it to bank one and POKE a single byte to tell the program it's in bank one.

To delete the menu program, exit by hitting Shift and F8 together. This sets the memory pointers back to what the Model 100 expects.

Changes your Model 100 into a totally different computer with capability you never thought possible.



Infoworld
rated Lucid's
performance
"excellent"

PCSG says "Satisfaction Guaranteed or your money back within 30 days!"

LUCID® is here now. It is on a ROM cartridge that snaps into the compartment on the back of your Model 100. It takes no memory to load and no memory for operating overhead. That means you have the full 29.6k bytes free to store your data.

First, LUCID® is memory conserving. It will let you build a large spreadsheet—255 row by 126 column capacity. You build huge spreadsheets in your Model 100's RAM that could consume 80 to 100K on a desktop computer.

Secondly, LUCID® is fast. LUCID® is so rapid, a 36 column corporate financial statement took less than 4 seconds to calculate.

Thirdly, LUCID® has features you won't find in most other spreadsheets. For example, when you type a label (text) it will cross column boundaries; in other words when you type a label or title it will appear as you type it irrespective of column or width. LUCID® also allows you to set column widths individually, and of course LUCID® has insert row and insert columns, as well as other standard features. LUCID® even lets your formulas refer to cells in other spreadsheet files.

Further, LUCID® has what no other spreadsheet has: Cut, Copy, and Paste. It uses the same keys as Cut and Paste in TEXT, but here's the difference: it takes all the formulas with it when you paste and they all automatically recalculate with the entire sheet.

And here is what is really amazing. You can copy or cut from one spreadsheet and paste into another spreadsheet or even a TEXT file.

LUCID® supports all BASIC math functions as well as Log, sine, cosine, tangent, exponentiation and other sophisticated math functions.

LUCID® has so many features that you will say "this is what I need in a spreadsheet", such as automatic prompting of an incorrectly typed-in formula showing just where the mistake was made.

LUCID® has expanded "go to" functions that remember and produce a windowing capability.

But perhaps most remarkable is that LUCID® is not only a spreadsheet but a program generator as well. First, LUCID® lets you protect all cells against entry or change, and then unprotect just the cells you want for someone else to use as input fields.

LUCID® will not only process values, but text input as well so that the facts other than numbers can be responded to. LUCID® has the ability for you to refer in a formula to cells containing words. This feature combines with the capacity of doing "if then" statements that work by doing table lookups against even massive X/Y charts of text or numerical information. You can produce a program that responds to inputs with no programming knowledge whatsoever.

You can prepare a report section in your spreadsheet with instructions to your user for printout, and they can produce a personalized printout that responds to their input. All your formulas and tables that did the calculations and provided the facts are invisible to that user. LUCID® is useful for doctors for patient questionnaires, troubleshooting technicians, purchase clerks, people doing job quotes, stores for customer workups, insurance agents and anybody who needs to process specific facts and numbers to produce a report based on those responses.

LUCID® comes with a manual that explains not only the characteristics of LUCID®, but will train you how to use a spreadsheet even if you have never seen one before. You are shown how to do budgets, forecasts, breakeven analysis, amortizations and many other types of personal and business reports and calculations.

User friendly is such an over-used term in this industry, but a typical comment has been "I have never seen a spreadsheet that does so much, and yet LUCID® is so much

easier and faster to use."

LUCID® is a result of a most exhaustive developmental effort in which PCSG's objective was to develop a spreadsheet that was better than the state-of-the-art. We are so pleased because LUCID® provides for the Model 100 spreadsheet capability you cannot equal on a desktop computer.

LUCID® is, in our opinion and that of those who have examined it, a breakthrough. We sell it on a 30 day trial. If you are not completely satisfied, return it within 30 days for a full refund. Priced at \$149.95, on snap-in ROM. MasterCard, Visa or COD.

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First with
software for
the Model 100

PORTABLE
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PCSG VS. PG DESIGN

The menu program makes using the RAM bank a pleasure. It also takes up 1432 bytes of space, giving each function key a special purpose:

- F1, F2 and F3, when pressed, change to that memory bank.
- F4 copies the file the cursor is on to any other bank.
- F5 kills the file the cursor is on.
- F6 renames the file the cursor is on.
- F7 toggles between adding a line feed to printed documents.
- F8 returns the normal Model 100 menu system.

SOFTWARE IN A CHIP

PCSG's RAM board inserts easily into the socket on the bottom of the Model 100. RAM Plus contains chip-based software allowing easy use of the RAM Plus memory banks.

After the chip is inserted, enter BASIC and key *CALL 63012*. That places RAM Plus into the 100. This technique is used by all ROM manufacturers to bring up firmware.

The bottom of the screen contains a new set of labels for the function keys. Above that are two questions. First, how much memory is free in the bank logged into. Second, how many bytes long is the file under the wide-bar cursor. The function key distinctions are:

- F1 moves the 100 to the next sequential bank. If it's bank one, F1 moves to bank two.
- F2 renames the file under the wide-bar cursor.

• F3 brings up a GOTO program inserted into memory in place of RAM Plus. When the RAM Plus chip is removed, bank switching would normally be impossible. F3 places a small machine-language program into each bank so that bank switching is feasible. However, F3 also causes the bank program to leave the main menu. To use the GOTO program and still have the bank number program in the menu, reenter BASIC and type *CALL 63012*.

- F4 copies the file under the wide-bar cursor to another bank or to a new file in the same bank.

- F5 kills the file under the wide-bar cursor.

- F6 toggles, adding line feeds after carriage returns on printers.

- F7 sets DATE, DAY and TIME.

- F8 returns the standard Model 100 menu.



Transferring machine-language programs without interfering with the GOTO machine-language program and LAPSTAR presented a problem. PCSG recommended the following program, which allows bank switching if the GOTO program was erased. This program is not in the documentation:

10 POKE -2,211: POKE -1,X: CALL -2

The X should be replaced by the bank number being switched to. Cryptronics calls their banks, internally, 0, 1, 2. It's easier to call the Move Program goto 1, goto2 and goto3, avoiding bank 0.

The RAM Plus expansion module would be more valuable if PCSG gave equivalent software to move and copy from bank to bank.

SOFTWARE TESTED

My Model 100 is used mostly for writing while on the road. I like to work with LAPSTAR in memory as my writing software and DISK Plus as my installed chip. This allows immediate connection to my Compaq when I return and need to upload files to WordStar. This combination works perfectly with both RAM expansion modules.

I also tested the boards with PCSG's WRITE Plus and LUCID and found no problems. The Radio Shack statistics programs and Traveling Software's T-VIEW 80 also worked smoothly.

MEMORY TRADE

To choose between the RAM expansion modules is a matter of taste: Do you like to use ROM-based software such as RAM Plus to run the banks, or do you prefer software-based programs such as PG Design's?

I prefer ROM-based software for easy switching between DISK Plus and RAM Plus. If any vendor comes out with a ROM bank enabling users to keep a number of chips active and available with the throw of a switch then I'll be completely satisfied. And then I'd recommend PCSG's as the best and easiest to use.

But PCSG only offers software to move and copy between banks on the chip. The small-machine language program left when the chip is removed allows bank switching, rename, copy, kill or other features when the RAM Plus chip is out of the machine.

Although PG Design's module is always there to use since it runs in the software, it's PCSG that offers 4K more of usable memory per bank.

However, PG Design has created a neater design with its user-replaceable battery.

Today I have the PG Design module in the 100 in order to load Lapstar into bank three and transfer files to the other banks when bank three's memory is full. But yesterday I used PCSG's because I had loaded Lapstar into all three banks and filled up each, using DISK Plus to upload to the COMPAQ. Tomorrow, who knows. The trade-off is memory. The decision is yours. □

A Second Opinion

BY STEPHEN R. LANKTON

Stephen R. Lankton is an author, international trainer in the fields of psychotherapy and family therapy, and editor of *Ericksonian Monographs*. He relies daily on his Model 100 and Tandy 2000 computers. —Ed.

My criteria for choosing one RAM over the other are construction, durability, convenience and price.

PG Design's product has one superior hardware feature: battery placement. PCSG's has three nickel-cadmium cells in plastic shrink-wrap. The battery hangs on the end of two twisted wires and is tucked between an open space between the Model 100's ROM socket and (continued on page 60)

ON THE DOT WITH T-WRITER

T-Writer

Text processor for Model 100, NEC PC-8201A and Olivetti M-10

Version 2.0

Traveling Software Inc.
11050 Fifth Ave. NE
Seattle, WA 98125
(206) 367-8090

Minimum 9K to store and operate
short version

\$49.95

Circle No. 144

by J.R. WILSON

Surveys show word processing to be the most popular use of the Model 100—and, presumably, its cousins from NEC and Olivetti. Considering the primitive nature of the 100's built-in Text program and the limited scope of formatting programs available from third-party vendors, this is remarkable.

When a new text processor offering useful bells and whistles comes along, then, it's greeted with sighs of relief and great expectations. With this must come the understanding that, while Model 100 software generally is less expensive than that for personal computers, a random-accessed memory (RAM)-based program can't be all things to all writers.

One of the latest entrants into this RAM-conscious world of laptop word processing is Traveling Writer, or T-Writer, from Traveling Software. While T-Writer is no WordStar, it does offer a broad base of dot commands giving far greater control over the printed document.

'GRAPH BUG CAUGHT

The review copy provided by Traveling Software contained a bizarre fault rendering T-Writer useless for serious writing until combined forces corrected it. T-Writer occasionally refused to indent paragraphs.

The problem was called to Neil Smith's attention, the firm's chief troubleshooter, who traced it to its source.

"It appears to have been a side effect of a program change that enabled a global dot command for justified text," he said. "The next version will include the fix."

For those who may have a copy of Version 2.0, the fix is quite simple. Load the

program to BASIC and type *EDIT23* to go to the proper line. Find statement *IFFFI=1* and change it to *IFFI>0* to overcome the indentation glitch.

Traveling Software's responsiveness in finding a fix for the problem is gratifying in an industry often refusing to admit problems exist.

Despite the pressures of competition, trying to get an edge by issuing faulty software or hardware is more costly in the long run—in both the expense of replacing errant products and, more importantly, in customer confidence.

Traveling Software has a good reputation and has produced noteworthy offerings for the laptop market. With the indentation problem fixed, T-Writer joins that array with a number of capabilities to recommend it.

THE TRADITION

As with other Traveling Software products, and unlike PCSG's Write Plus, T-Writer doesn't require a separate command (.CO) file to operate. Traveling Software has eliminated the .CO problem by a technique creating the required .CO subroutines from within the BASIC program during execution.

Both TWRIT1 and TWRIT2 (a somewhat longer version featuring limited function-key applications) take up more RAM than the three-part Write Plus system (4.1K). On the other hand, T-Writer offers more versatility.

In Traveling Software tradition, the program comes with both a written manual and an audio tutorial on side two of the cassette containing the programs. In addition to TWRIT1 and TWRIT2, side one also contains three sample documents for practice, a file to print mailing labels and a Memory Manager program providing worthwhile utilities.

FUNCTION KEY CONTROL

While both versions of T-Writer make extensive use of dot commands, TWRIT2 offers some function key control. With the function keys you can:

- Set the number of characters per line, always beginning from the extreme left edge of the paper;
- Cause a line-feed command to be

sent to the printer with each carriage return;

- Set linespacing;
- Set left and right margins (this overrides any characters per line setting you may have made);
- Create a centered, one-line header (without page numbers);
- Turn off automatic page numbers or set the beginning number;
- Set the number of lines per page and top and bottom margins; and
- Print document.

The function key to watch out for is F8 (MENU) which returns you to the computer's main menu and wipes out every command issued.

This is a problem with T-Writer. If most of a user's work involves the same settings—and it's highly unlikely those would be the program's default values—the appropriate functions have to be reset with each use.

It would have been helpful if Traveling Software had allowed for user-defined defaults. They can be changed the hard way by editing line 65 in the program.

Another problem encountered involved the line-feed command which didn't work properly with any of the printers used.

DOTING DOT COMMANDS

Every option except line-feed can be handled through dot commands, which take precedence over any values set using the function keys. Several additional dot commands greatly increase the flexibility of the program and redeem its confiscation of precious RAM:

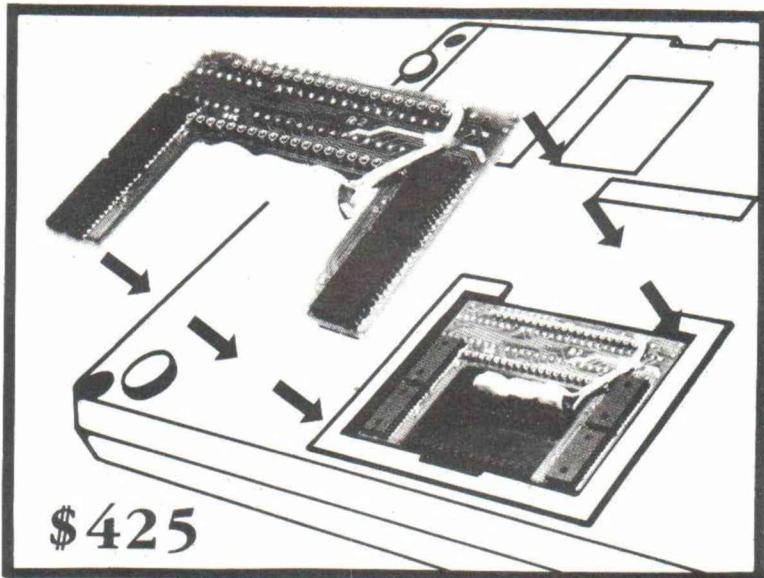
- Page layout sets page size, top, bottom, left and right margins, and page numbers, as well as eliminates page numbers and establishes conditional page breaks;
- Text format justifies and ends justification, skips a specified number of lines between two blocks of text, moves to a specified tabulation point, writes a multiple line heading, centers text and inserts a page footer;
- Tab overcomes one of the more frustrating drawbacks to TEXT in the Model 100: fixed tabs; and

(continued on page 56)

Give your Model 100

128K RAM

Installs as easily
as plugging
in a socket



Software included, transfers from bank to bank. Works like main menu! Includes powerful RAM Basic that lets programs store and access data from any other bank.

PCSG says: Satisfaction guaranteed or your money back within 30 days

As amazing as it seems you can upgrade your Model 100 to 128K of RAM in just 60 seconds.

It comes to you right out of the box looking just like the picture. You just open the little compartment on the back of your Model 100 with a quarter and it just pushes right into place. You can then put the cover back in its place.

You then have 4 banks of RAM of 32K each. The additional three banks also work just like your Main Menu.

You push a function key and you are in the second bank. Push again and you are in third, again, then fourth. Press it once again for your original bank.

It has its own built-in NiCad battery that recharges right from the Model 100 and its guaranteed for a full year.

What is really great is that you can copy a file from one bank to another with just a function key.

Each bank is like having another Model 100, and all the built-in programs as well as any snap-in ROM programs appear in all four banks and work the same way. Your widebar cursor moves from file to file and you access any file or run any program just by pressing ENTER.

What lets you copy any file from one bank to another is a snap-in ROM from PSG called RAM+, that comes at no extra charge. It just pushes right into the little socket in that same compartment with the 96K expansion unit.

Not only does this firmware let you copy a file from bank to bank, but you can make a copy of any file within the same bank instantly with a function key. Great for Lucid spreadsheets!

Copy a file from bank to bank with a function key

You can also rename a file, or kill any file with just a function key. Plus you can do a whole lot of other useful things like setting the date, day and time with function key ease. You even have a function key that lets you use non-Radio Shack printers without having to make those tricky dipswitch settings.

RAM+ lets you cold start any one of your banks without affecting the other three. That means that anytime you want you can clean out a bank's entire memory, but leave intact all the files in the other banks.

What is also fantastic is that you don't have to have the ROM in place to use the additional RAM. Whenever you take out the snap-in ROM it leaves behind a tiny machine code program that lets you switch from bank to bank just by pressing ENTER.

This lets you use your ROM socket to snap-in other ROMS like LUCID spreadsheet, WRITE ROM text processor, or DISK + ROM file transfer program, and use them in any or all four banks. All of these, by the way, are available from PSG.

When you are ready to copy a file from one bank to another or use any of the other fantastic functions we talked about you can just snap the RAM+ ROM back into place.

Everybody that has this 128K system in their Model 100 is so excited, because it gives them four times the capacity and all banks work just like the Main Menu.

And what has made a lot of people happy is that the system bus, located in the same compartment, is left free for you to plug in a DVI or the Holmes Engineering/PCSG portable disk drive.

The ability to copy a file from bank to bank instantly with a function key, plus all of the other features make this RAM extension truly an engineering masterpiece.

Some people hesitate when they think of installing something, and then others are skeptical that any additional hardware could be as good as the Model 100 itself. That's why we sell these 96K expansions on a 30 day trial. Simply return it within 30 days for a full refund if you are not satisfied. Priced at \$425. MC VISA COD.

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FIELD NOTES (from page 27)

INPUT FORMAT

Listing two shows two sample .DO data sets for the x-y graph program. The first data line of each holds the test location. The second line contains the test date and time. Lines in the .DO files aren't numbered, but begin with the data in column one.

The third line contains three items separated by commas. First is a description of the readings. Next is a conversion factor. Some readings involve a millivolt drop, which must be multiplied by a conversion factor to provide a final reading in amperes. Input 1 here if a conversion factor isn't involved. Last is a code 1 if the sign is to be reversed on each second reading. Voltage readings to a reference cell generally are negative. To avoid the necessity of typing a negative sign for each reading, allowance is made for the program to supply the negative sign.

The remainder of the file contains results of a series of two readings in sequence. Cable-to-reference cell voltages are always the second item in each set of two readings. □

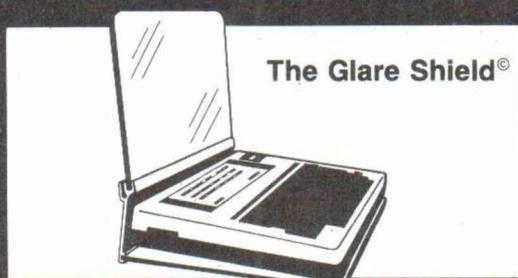
Please help us rate this article's value. If you've found it very valuable, circle 179 on the reader service card. If it was moderately valuable, circle 180—and if it wasn't valuable to you, circle 181.

```
.7,.368,.4,.382,.3,.402,.4,.388,.1,.519
.1,.415,.2,.396,.3,.368,.2,.492,.5,.364
Ø,.458,Ø,.528,Ø,.551,.3,.579,.1,.451,.2,.486
.1,.537,.2,.397,.4,.373
```

Data File to Produce Chart

```
Jersey City-PATH Shaft - Bond open/Sub2 Bond Closed
10/23/84 12:32pm
Ca-Bus(V)/Ca-OE(V),1,1
Ø,.424,-.3,.486,.2,.376,Ø,.381,.6,.267
.1,.366,-.2,.436,1.5,.101,4.4,-.147,Ø,.386
.3,.392,.4,.304,.1,.377,.2,.356,1.5,.142
.5,.284,.4,.309,.9,.195,2.9,.034,7.2,-.406
1,.215,.5,.272,Ø,.322,Ø,.397,-.4,.486
.2,.423,.3,.287,-.4,.518,.6,.331,.4,.383
.4,.386,Ø,.428,.3,.363,.2,.387,.2,.386
.7,.368,.4,.382,.3,.402,.4,.388,.1,.519
.1,.415,.2,.396,.3,.368,.2,.492,.5,.364
Ø,.458,Ø,.528,Ø,.551,.3,.579,.1,.451,.2,.486
.1,.537,.2,.397,.4,.373
```

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PIXELS (from page 22)

table one

Addr	Value	Mnemonic	Comment
64000	235	XCHG	;Puts screen address in DE
64001	33	LXI H, 64010	;8-byte storage area
64002	68		
64003	238		
64004	34	SHLD 65188	;Store in 65188 and 65189
64005	164		
64006	254		
64007	195	JMP 36272	;Jump to ROM
64008	176		
64009	141		

64010-64017 = Destination for Pixel Map.

Line 2030 starts the loop that works down the pixel lines.

Line 2040 tells the printer that the next 480 characters will be graphics characters.

Line 2050 starts the loop that goes across each pixel line.

Line 2060 computes the screen address.

Line 2070 calls the pixel accessing routine.

Line 2080 returns the status of the

six-pixel row.

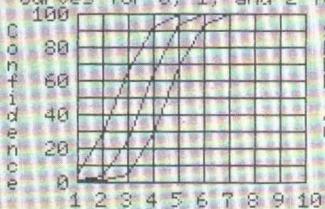
Line 2090 looks at the six bits in the present pixel and isolates them.

Line 2100 prepares the character for sending to the printer. If the pixel is off, ASCII 0 is sent. Otherwise, ASCII 96 is sent to the printer.

Line 2110 prints the graphics character twice. The ROM routine 5520 is used because LPRINT won't accept ASCII 0.

Line 2120 ends the loops. LPRINT is used to send a carriage return following each line.

Confidence versus Test Cycles
Curves for 0, 1, and 2 Test Failures



Samples: 4
Des Cyc: 100000
Reliability: 99
Weibull: 3
J. Irwin
06/11/85

Test Cycles/Sample in 100,000's

figure one
Elaborate graphs created on the 200's LCD screen can be printed out for posterity.

TO THE DUMP

The screen dump programs can be incorporated with any BASIC program. Simply use them as a subroutine by using the GOSUB command. Or program a function key to access the subroutine. For example, the command `KEY ON: ON KEY GOSUB 1000` will call the screen dump routine if F1 is pressed. □

Please help us rate this article's value. If you've found it very valuable, circle 167 on the reader service card. If it was moderately valuable, circle 168—and if it wasn't valuable to you, circle 169.



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*Statimate software from American Technologies Inc. designed to run on Radio Shack Model 100 32K Ram portable computer. Statimate software available separately for \$300.00.

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Circle 15 on Reader Service Card

GIGO (from page 8)

30 Model 100s our reporters use.

Mr. Garrigues says his NEC PC-8201A was wiped out after it spent the night under an Atex terminal. I can't speak for the NEC, but I've seen Model 100s stored on top of heavily-used Atex terminals for 24 hours with no ill effect — although I'd surely not recommend the practice. Nor have there been reports of memory loss from the hundreds of newsrooms across the country.

Was a telephone junction box in use under the desk? They're often fastened to the desk with rather strong ceramic magnets. It's the magnets that cause the damage.

Frank Heick
Philadelphia, PA

LINEFEED FOR TELEXING

Here's help for my colleagues who go through a telex network like ITT and whose files arrive without linefeeds.

This short program is less cumbersome than many on the market providing a linefeed for telex transmission.

Go into BASIC and type *new*. At the *Ok* prompt type *poke 63066,1*.

When the *Ok* prompt reappears, a telex linefeed will have been perma-

nently installed in your Model 100.

The BASIC program makes sure the 1 is filed in address 63066 every time:
10 N = 63066: IF PEEK(N) <> 1 THEN
POKE N,1
20 PRINT N; PEEK (N),
CHR\$(PEEK(N))

Heinz P. Lohfeldt
Washington, D.C.

NEC NOTES FROM TECH NOTES

Here are some observations on the NEC PC-8201A and its Japanese counterpart gleaned from the PC-8200 Technical Notes (mentioned in Mail 100/200, May 1985) and some literature obtained from Japan.

The PC-8201A can be configured as a 64K RAM machine using the CPU output port 161, which is accessible from BASIC using the OUT command. At least two full RAM banks are required to do this. One of them may be the bank three cartridge or Purple Computing's Side Car.

For example, the contents of the standard ROM may be copied into bank two. This is accomplished with the PUTBNK routine, documented in the Technical

Notes, but with the ASCII character data starting at address 3093 modified.

The copier program was executed in bank one. After enabling the write protect switch on bank two, execute OUT 161,2 from BASIC in bank one. This creates a new "standard" character set in a full 64K RAM machine. Turning off the computer and turning it back on reactivates bank one/standard ROM configuration. Switching into bank two after removing write protection causes a cold start in that bank.

• Both serial input/output (SIO) ports on the PC-8201A can be used as RS-232 protocol null-modem ports, except in applications not using TELCOM. This is because TELCOM always outputs from the regular RS-232C port.

You can make your own cables from six- or eight-conductor modular phone cables (available from the Inmac company and NEC, part numbers PC-8299A-6 and PC-8299A-8). Cables are needed for switching the "transmit data" and "re-ceive data" wires, and for switching the "request to receive" and "transmission authorized" wires.

Tie all ground wires together but leave the five-volt vcc wires.

Two or more PC-8201As can be con-

PORTABILITY



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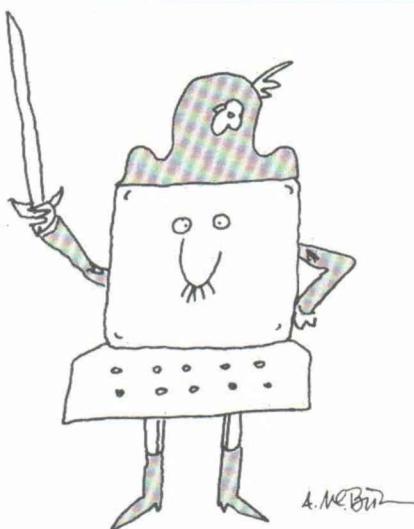
Circle 21 on Reader Service Card

nected through the SIO ports. Don't connect an SIO port to the regular DB-25 RS-232 port. Switch all RS-232 signals to the desired port by using the CPU output port 144, as documented in the Technical Notes.

Possibilities: Synchronize many PC-8201As and Model 100s for a symphony using BASIC's SOUND command, or create a "ring" Local Area Network (LAN) of PC-8201As using BASIC's ON COM GOSUB command. Model 100s can be added but only in a "star" pattern emanating from the PC-8201A "ring".

• The SIO1 port was originally intended for the 3.5-inch floppy disk unit, PC-8231A. The SIO2 is for a RAM disk device not available here—and may not be available yet in Japan. Also, the Japanese version of the PC-8231A (the PC-8233) allows connecting up to two 5.25-inch floppy disk drives. But it's not really portable.

• A 128K ROM cartridge can be addressed through the system slot on the side. This unit, the PC-8201-01, is sold in Japan and provides the data for 2,965 complex Chinese characters. Nevertheless, there are probably many uses for such a ROM with different data in our country.



Some examples are storing map data for navigation, molecular formulas for chemistry or graphics for an adventure game. The 128K ROM is controlled by CPU output ports 128, 132, 136 and CPU input port 140.

• Many other interesting peripherals are available in Japan. The PC-8205 is a 32K ROM cartridge of unknown purpose. It looks like the RAM cartridge

and may be an erasable programmable read-only memory (EPROM).

The PC-8240 cathode-ray tube (CRT) adapter supports 25 lines by 80 columns, but is nearly the same size as the PC-8201A. Eighty columns is possible in Japan because their televisions have a higher resolution than ours. The adapter also has different BASIC commands and supports a monochrome resolution of 640 by 200 pixels. Color resolution is 320 by 200 pixels.

The PC-8268 is an acoustic phone coupler modem. The PC-8269 is an "intelligent phone," a combined telephone/modem unit. A bar-code reader, the PC-8246 looks exactly like Radio Shack's unit. All of the Japanese peripherals should work with the PC-8201A, taking into account the voltage differences between Japan and the U.S.

William N. Kumai
Bay Area NEC/100 User's Group

CHICAGO AREA BBS

Portable 100/200 reader Shawn Berg (CIS # 72217,1355) informs us of a new Model 100-based BBS with four message bases called Subbuteo World. To contact Subbuteo World, call (312) 438-9529. □

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Circle 20 on Reader Service Card

DEDICATED 100 READING

The Model 100 Program Book

Terry Kepner and David Huntress
Weber Systems Inc.
8437 Mayfield Road
Cleveland, OH 44026
182 pages
\$12.95, softcover

Many Portable 100/200 readers have been waiting for this book whose author has appeared frequently in these pages. It includes 51 short, interesting and useful BASIC programs specifically designed for the Model 100.

Each program is prefaced by a brief and clearly written introduction. Beginners will find it a helpful guide to financial, business, educational and home programs as well as graphics, games and sound. It even includes a program to chart your biorhythms!

Things To Do with Your TRS-Model 100 Computer

Jerry Willis, Merl Miller and Cleborne D. Maddux
Dilithium Books (Signet)
1633 Broadway
New York, NY 10019
182 pages
\$3.95

This easy-to-read book gives new and experienced computerists more ideas for using their investment, along with information concerning where to find programs to implement those ideas.

Things To Do doesn't give program listings. Rather it tells where to find programs already written to serve your purpose. Each chapter is devoted to one program in the Model 100's read-only memory (ROM). The most detailed chapter covers available business software. Other fields—including education, simulations and word processing—are covered well but in less detail.

Also included is a large section devoted to games and an incomplete list of software publishers. This idea book gives good value for the price.

Financial Decision Making with your TRS-80 Model 100, Including 18 Programs

Leslie Sparks
Tab Books
Blue Ridge Summit, PA 17214
144 pages
\$9.95 softcover; \$14.95 hardbound

Ratio and regression analyses, forecasting and discounting — this is what makes up Financial Decision Making. The book includes programs and accompanying documentation. It's designed to provide easy ways to carry out messy money calculations necessary to make better financial decisions.

The text tells what numbers to put where and which buttons to push. It's also designed to help the reader better understand what the calculations mean and why they're important.

Sorry about the Explosion: A Humorous Guide to Computers

David D. Busch
Prentice-Hall
Englewood Cliffs, NJ 07632
152 pages
\$7.95, softcover

This tongue-in-cheek attempt to poke fun at computer users and the industry will make even die-hard hackers laugh. Computer users will find something familiar about the products of KTI, a fictitious company whose mottos include: *Kitchen Table, Inc., — Serving the Industry Since January and We Stand Behind Our Products — It's Safer!*

The book includes tips on KTI products and how to avoid them, reviews of its user-hostile, manufacturer-friendly software and partially-debugged programs that you can run on your own computer for frustrating friends and influencing family.

The Illustrated Multiplan Book

Russell A. Stultz
Woodware Publishing Inc.
Plano, TX 75074
176 pages
\$16.95, softcover

This well-organized book should tell you everything you need to know about using Multiplan. Designed to be both a teaching guide for beginners and a quick reference for intermediate and advanced users, its alphabetized, modular format lets you find answers easily. Models are provided to help solve real problems. Clear and concise, this book goes beyond standard documentation to present well-illustrated information about a complicated application.

Minute Manual for the Dot-Matrix Printer

Jim Pirisino
Jim Pirisino and MinuteWare
P.O. Box 2392
Columbia, MD 21045
166 pages
\$12.95, softcover

This is a non-programmers guide to buying, using and understanding dot-matrix printers. It includes in-depth information about printing features, physical features, connecting a printer (interfaces, graphics, fonts and buffers) and printer/computer communications.

Chapter Seven describes six popular printers' features, advantages and disadvantages. Chapter Eight is a buyers' guide comparing the same six, with blank forms for you to compare features on other printers.

Telecom

Talking Back: Custom-Made Online Computing

Darby Miller
Micro Text Publications Inc.
(Prentice-Hall, Inc.)
Englewood Cliffs, NJ 07632
230 pages
\$15.95, softcover

Get Connected: A Guide to Telecommunications

Tom Kieffer and Terry Hansen
Ashton-Tate

Model 100 - NEC PC 8201A
Olivetti M10



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AutoPen (2.5K) \$29.95 - Word processing using standard formats. 22 text commands for format control. Print from RAM, tape and keyboard; chain files; multiple copies; continuous or cut paper; and more features. Customize for your printer. Best available for size and price.

AutoPen, N&A (3.7K) \$39.50 - Merges names, addresses and salutations into letters, prints labels and addresses envelopes. N&A data management system. Includes AutoPen.

AutoPad (5.4K) \$39.50 - 26 by 99 spreadsheet. Variable column width and format. Math, statistical and financial functions. Sort, replicate, calculator and other features. Printer output with titles and footnotes.

AutoBase (2K) \$29.50 - Database management for limited RAM. Design input forms using up to 16 fields. Use up to 9 keyword or relational field criteria to select records for display or printing. Print forms or specific fields in a list or label format.

AutoSort (4K) \$14.50 - Sort single or multiple (AutoBase, N&A, INDEX, etc.) field records.

BOOK (3.8K) \$29.50 - Single entry book-keeping for self employed or small businesses using SCHEDULE C tax accounts. Summary review and detailed printer output.

TFILE (1.4K) \$29.50 - Tape file utility to review, compute size, delete, and auto save or load files. Tape directory with printer output.

TRIP (2K) \$29.50 - Itinerary, expense account and trip report. Review and printer output.

CHECK (2K) \$29.50 - Maintains account balance and records. Review and printer output.

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BOOK BITS

10150 West Jefferson Blvd.
Culver City, CA 90230
423 pages
\$24.95, softcover

If you go *online* without knowing what you're doing, the phone company and information service could send you to the poorhouse! Talking Back and Get Connected are detailed but non-technical guides for users of online services. Both introduce you to telecommunications hardware and software, commercial data bases and online services and consumer information networks.

The books tell you how to communicate through your computer for business and recreational purposes.

Talking Back is more detailed and written for a more sophisticated audience than Get Connected is. For example, Get Connected mentions teleconferencing but Talking Back describes how to do it. Get Connected gives some background on bulletin board systems (BBSs) and briefly discusses how to start your own BBS. Talking Back tells you about security considerations, helpful hints, hardware needs and includes a list of software packages for BBSs.

While both books would be useful for inexperienced online users, Talking Back will also appeal to the intermediate telecommuter.

Dictionary of Computer Graphics

John Vince
Knowledge Industry Publications Inc.
701 Westchester Ave.
White Plains, NY 10604
132 pages
\$34.95, hardcover

What's a fractal? What does mouse mean in graphics jargon?

This well-illustrated book catalogs alphabetically the concepts, principles and terms employed in computer graphics. A special eight-page four-color insert illustrates the beauty and complexity of computer-generated images and graphics techniques. The book also includes a select list of references, associations and publications.

Charged Bodies

Adventures in Microland
Jerry Pournelle
Baen Enterprises
8 West 36th St.

(continued on page 57)

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Circle 22 on Reader Service Card

T-WRITER (from page 48)

• Information retrieval inserts information drawn from the Model 100's clock/calendar.

A sequential numbering option offers the opportunity to run up to 10 separate numbering sequences simultaneously. For example, a document could be written with numbered paragraphs, footnotes and page footers combining chapter and page numbers, while T-Writer kept track of the various numbers.

Dot commands also are available to send certain output instructions, such as printing multiple copies, changing the output destination and pausing between pages.

There's also the option of sending special printer controls for tasks such as underlining and boldface. Use a dot followed by the decimal equivalent of the appropriate control code for the printer.

FORM LETTER T-MERGENCE

The feature called T-Merge allows the user to send personalized form letters. T-Merge draws the appropriate names and addresses from a specially-constructed ADRS.DO file.

Using special dot commands, it also can draw other data from ADRS.DO, for example, previous purchases and last

time met. This requires precise creation of the ADRS.DO file—and the T-Writer manual provides excellent, step-by-step instructions.

Such an ADRS.DO entry appears as: *Mr. John Doe, 123 Main St., South Bend IN, 619-555-1212, 62382, ZYX Inc., specialty software, June 7, project administration program, John*

And a sales call follow-up letter to this customer would be typed as:

*NAM
EX1
ADD
.ST EX0
.SKP2*

Dear EX5:

It was a pleasure to see you EX3 and see how well you are doing with your EX2 business. The EX4 you ordered during my visit was shipped yesterday and should reach you within the week.

Which would print out as:

*Mr. John Doe
ZYX Inc.
123 Main St.
South Bend IN 62382*

Dear John:

It was a pleasure to see you June 7 and see how well you are doing with your spe-

cialty software business. The project administration program you ordered during my visit was shipped yesterday and should reach you within the week.

For those who do bulk mailings, another option available with T-Writer is a mailing list label printer. This draws on a short (38 byte) text file named LABELS.DO, which can be adjusted to print any size of label. The user types *labels* in response to the document prompt from T-Writer. LABELS automatically accesses ADRS.DO and prints out mailing labels for each entry listed.

FINAL THOUGHT

Overall, T-Writer offers a significant number of options at a low cost and without consuming unreasonable amounts of RAM. Customer support is good, documentation is easy to read and comprehensive, and price is reasonable. With the paragraph indentation problem fixed, Traveling Writer is now an easy program to recommend for the user searching for an answer to the problem of Model 100, NEC or Olivetti text formatting. □

Please help us rate this article's value. If you've found it very valuable, circle 176 on the reader service card. If it was moderately valuable, circle 177—and if it wasn't valuable to you, circle 178.

Why Handle Files One at a Time? Let XOUT/XIN from BKI do the work for you.

Eliminate tedious (and fault prone) load/save/kill and format procedures on your MODEL 100. XOUT/XIN programs automatically create/read and display RAM and external directories. Resulting free space is displayed as files are selected/deselected to aid in memory management. Menus and prompts provide a safe, easy-to-use file management utility—an amazing productivity tool.

Use XOUT.BA to send multiple copies of selected memory files to the tape (**Save**); or send them directly (**List**), or via a formatter (**4mat**), to either the printer or the screen. Selected files can simply be removed with the **Kill** command and confirmation. An external directory is automatically created for each copy of a file set that is saved (containing creation date and time, and an ordered list of names and file sizes). Files saved on tape, including the directory, may also be loaded one-by-one by BASIC or TEXT, in the usual way.

Use XIN.BA to automatically **Load** selected tape files back into memory; or send them directly (**List**), or via a formatter (**4mat**), to the printer or the screen.

Typical XOUT.BA Menu

XOUT	B	38745 NAMES	D	401	:SPREDIC 1007:
DO4MATB	B	84891:CHAP02D	D	1390	:SPRED2C 1507:
BA4MATB	B	2011:CHAP03D	D	9297	:SPRED3C 1853:
BASIC	D	2011:PERCAPD	D	1853	:SPRED4C 2041:
LIST2	D	801:paste D	D	424	:SPRED5C 2221:
		2221 Free	D	26968 Used	29189 Total

Save List 4mat Kill Abort Menu

Typical XIN.BA Menu

XIN	B	09CHAP01D	D	240:
XOUT	B	01CHAP02D	D	240:
DO4MATB	B	01CHAP03D	D	1853:
BA4MATB	D	-1201:PERCAPD	D	90:
LIST2	D	801:SPREDIC 1007:	D	21679 Used
		7510 Free	D	29189 Total

Load List 4mat Next Abort Menu

- XOUT.BA -

- Displays memory contents in memory address order.
- As files are highlighted memory statistics are changed to reflect values if **Kill** selected.
- BA files are stored on tape as standard tokenized files.
- Label line alternatives with statistics line by toggling the label key.
- Any combination of files can be highlighted by positioning the pointer and pressing space or enter. No action is taken until commanded by a function key, and then all highlighted files are affected.
- The **4mat** command invokes the BA4MAT.BA program to format BA files and the DO4MAT.BA program to format DO files.

Skeleton BA4MAT.BA and DO4MAT.BA programs are provided as examples for interfacing existing formatters. Full featured BA4MAT.BA and DO4MAT.BA programs, already interfaced with the XOUT/XIN programs, are offered as separately priced items. DO4MAT.BA and BA4MAT.BA format a single file if executed from the main menu or multiple files if executed via XOUT or XIN.

- Displays tape contents in tape position order.
- As files are highlighted memory statistics are changed to reflect values if **Load** selected.
- If the file name exists in both the tape and memory directories, the difference (+, -, 0) in size is shown.

- XIN.BA -

- Formats documents using embedded command descriptions for many features, including columns, underlining, **bold print**, filling and adjusting.
- Optional headers and footers may include the date, time and page number.
- Specify printer make and model. (Customizing directions given for printers not yet implemented.)
- Formats BA files so that the individual basic commands are listed one per line indented from the basic line number.
- Additional indentation occurs to diagram the IF-THEN-ELSE structures in the program.
- Pagination including the date, time and page number are provided.

- DO4MAT.BA -

- Formats documents using embedded command descriptions for many features, including columns, underlining, **bold print**, filling and adjusting.
- Optional headers and footers may include the date, time and page number.
- Specify printer make and model. (Customizing directions given for printers not yet implemented.)

- BA4MAT.BA -

- Formats BA files so that the individual basic commands are listed one per line indented from the basic line number.
- Additional indentation occurs to diagram the IF-THEN-ELSE structures in the program.
- Pagination including the date, time and page number are provided.

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BA4MAT.BA (skeleton)
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BOOK BITS (from page 55)

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Well-known computer columnist Jerry Pournelle is on a roll through the worlds of microcomputing. He looks at everything — the movers and shakers of microland, the best and worst of new software and equipment, the politics of major companies and licensing — and comments colorfully on all of it.

The book begins with the author's explanation of how he got into computing and writing about computers. The rest touches on many aspects of computing — from programing to pirates, from abacus to Zork. Pournelle puts heart and soul in this book as he writes about what it all means.

Cohabiting with Computers

Joseph F. Traub, Ed.
William Kaufmann Inc.
95 First Street
Los Altos, CA 94022
185 pages
\$15.00

People are outnumbered by computers

on our crowded planet. What issues and dilemmas are fostered by the explosive growth of computers?

Cohabiting with Computers contains thought-provoking essays by experts in high-tech and computer science and engineering. The chapter titles reveal some of the topics: The Electronic University; Modern Computing - A Force for Diversity or Conformity?; and Computer Science - Challenges and Responsibilities.

Overall this book sketches possible future directions of our educational-industrial-societal complex, touching on age-old questions of human destiny and the search of individuals for personal fulfillment.

Charged Bodies: People, Power and Paradox in Silicon Valley

Thomas Mahon
New American Library
1633 Broadway
New York, NY 10019
339 pages
\$15.95

Imagine a society where everyone literally eats, sleeps and breathes technol-

ogy — where bakers offer "silicon chip cookies", streets have names like "Disk Drive" and "people are classed as brilliant, very brilliant, or extraordinarily brilliant"?

This book describes the hard-driving, freewheeling "micro-culture" of Silicon Valley. It profiles key historical figures who laid the foundations for the growth of the valley and the computer industry. It includes interviews with today's biggest entrepreneurs and high-tech geniuses.

Artificial Intelligence: How Machines Think

F. David Peat
Baen Enterprises
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New York, NY 10018
370 pages
\$8.95

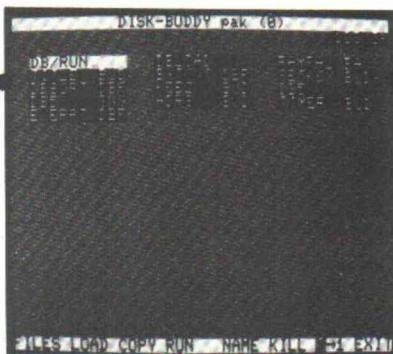
Do computers think? Are they self-aware, as humans are, or do they simply mechanically follow instructions?

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Hi-Tech and Organized

The Computer Log: The Best Thing Next to Your Computer

Howard Hillman
New American Library
1633 Broadway
New York, NY 10019

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"How do I boot this program? . . . Where's that scrap of paper with the SIG sysop's I.D.? . . . Oh no, the IRS is coming tomorrow!"

The Computer Log is designed to trace, organize and maintain all vital information on the use and operation of your business or home computer. Divided into 27 sections, the Log's workbook format provides room to note information such as software and hardware inventories, data-base usage, warranties and repair bills. A quick reference guide to codes, conversions and acronyms is included.

One section is designed to help you satisfy the IRS's new requirement: Logs must be kept to take a tax deduction for a computer as a business expense.

Through the MicroMaze: A Visual Guide to Getting Organized

Wayne Creekmore and
Stephanie Behasa
Ashton-Tate
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Once you've accumulated hardware, software and manuals galore, how do you manage the components to work comfortably and efficiently?

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Circle 41 on Reader Service Card

BOOK BITS

try. It's a directory for 16,000 software programs, 3,325 hardware and peripheral hardware items, and 6,565 computer books and magazines.

This book should answer all your questions about who carries what, who distributes where, and what does any specific microcomputer product cost? It includes up-to-date contact information for thousands of software and hardware producers, hundreds of book and magazine publishers, and hundreds of manufacturers of printer ribbons, paper and other supplies. It also includes a handy "Yellow Pages" section providing full and current contact information for over 4,000 companies or individuals active in the computer trade.

Making Money with Your Home Computer

Dana K. Cassell
Dodd, Mead & Co.
79 Madison Ave.
New York, NY 10016
143 pages
\$5.95, softcover

Opportunities for making money with a home computer are limited only by your

imagination — and your equipment. This book tells what software to buy, how to get started, where to look for potential customers, what services to offer and how to build and maintain a profitable and satisfying business.

Making Money is comprehensive, practical and full of stimulating ideas. Author and computer user Dana Cassell has written for and about business for eight years and is also a marketing consultant.

Dynacomp Catalog No. 28: Quality Software for Microsystems

Dynacomp Inc.
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Webster, NY 14580
144 pages
\$1.00

This is an extensive software mail-order catalog. Browse through over 500 titles for more than 30 computers to learn what's available. The catalog includes over 200 volumes of public domain (uncopyrighted) software for the IBM and Apple computers. Dynacomp sends a complimentary first copy upon written request.

Computer Care: The Complete Guide to Microcomputer Maintenance for Home and Office

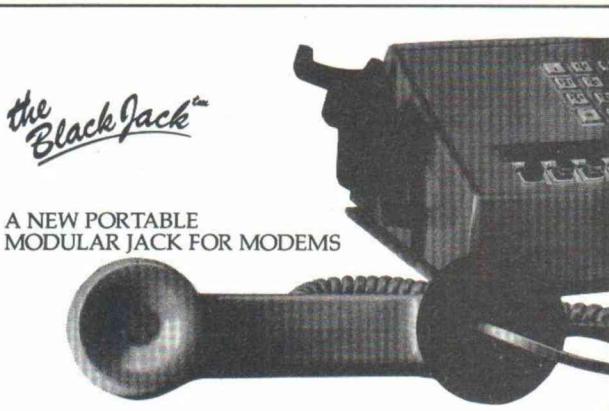
Herb Friedman
Micro Text Publications Inc.
(Prentice-Hall, Inc.)
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Your computer is down. Is the problem a stray magnetic field... or the ice cream you dripped on the keyboard? And what quick fix can you use?

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Descriptions and photographs include how to keep your machine meticulously clean, emergency repairs to damaged cables and connectors, and how to safeguard your data storage. A troubleshooting guide helps identify problems and possible solutions.

Please help us rate this article's value. If you've found it very valuable, circle 182 on the reader service card. If it was moderately valuable, circle 183—and if it wasn't valuable to you, circle 184.



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Circle 28 on Reader Service Card

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ONLY
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For 16k and larger machines.

SECOND OPINION (from page 47)

bus interface. That arrangement looks make-shift and hazardous, considering the frequent need to access the ROM socket.

PG Design's has a solid unit using a lithium cell placed firmly onto the board. The battery removes easily with a small screwdriver. Nothing dangles and battery life is two years longer.

The disk-video interface (DVI) connector on PCSG's module is constructed just like Radio Shack's delicate arrangement. PG Design's uses two rows of sturdy male pins and a different cable.

The PG Design RAM includes a 1.4K program in each bank — the program is loaded once from cassette into the original Model 100 RAM. This program provides simple bank-switching and data-transfer capability. It allows branching to any RAM bank from any other bank, and doesn't interfere with other resident machine-language files. The same program renames and kills files, toggles the TELCOM line feed and provides a menu display during a terminal session.

PCSG provides a choice. A small machine-language program allows bank switching. A ROM module, named RAM Plus, is required for transferring data between memory banks. Bank switching is in numeric sequence — going from bank two to bank one requires passing through bank three.

When in a bank, however, users must exit the ROM, wait for the menu to return and then use the Model 100. Transferring data requires that you reenter the RAM Plus program, transfer, change banks in prescribed sequence and reexit RAM Plus to continue.

When using other ROMs, it's more convenient to have PG Design's bank management software resident in RAM. By requiring the ROM for data transfer, PCSG forces users to do the lengthy procedure of exiting, turning off the Model 100, changing the ROM and finally resuming the application.

RISKY RIDE

Chipmunk drive owners will be influenced by other differences. The PCSG's RAM allows convenient piggy backing of the RAM boards and the cable interface. However, even with prop legs the 100 rests on the bottom edge of the RAM-disk boards and not on its rubber front feet.

This seems like an accident waiting to happen: The RAM board could rock out with pressure on the board, or the board or its components might be damaged. PG Design handles the interfacing with a short cable placing the disk-interface

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SECOND OPINION

board behind or under the 100's prop legs and out of the way on its own platform.

The PG Design RAM bank/copy software allows users to access the disk from any bank. When the bank-switching function keys are hit (and the disk drive is on) the user can access the new bank and have full contact with the disk drive.

PCSG's software involves a more complex process. Both RAMs require users to hit F8 to exit the drive operating system and then run the respective switching software.

Again, the single PG Design software will switch, copy and initiate the disk drive while PCSG's unit requires two separate programs to do the same (the copying or bank-switching program is on ROM, and the bank-switching or disk drive initiating program is done from a machine-language file). Thus, the PG Design RAM scores high on convenience when working this powerful disk drive accessory. Perhaps more importantly, it avoids the dangerous placement of the piggy-backed boards.

PG Design's RAM is faster and easier to use at every phase. Users of the Chipmunk must take along the extra interface cable when traveling with the disk drive — but this is only a minor snag in a totally expedient package.

CHOOSE CONVENIENCE AND DESIGN

PCSG has now advertised a 96K RAM module (for a total of 128K) and a ROM bank to hold and use six ROMs. These two additional accessories will give users 32K more memory to balance some of the construction and structural inconvenience, and solve the ROM-switching hassle.

At press time I'd yet to see these products and want to alert potential buyers and Chipmunk owners to ask about the piggy-backed board arrangement. Be certain the bottom disk-interface board doesn't hit the table top as it does now in the 64K version.

Both modules are very good products. Both transfer data, work great with the DVI, promise enhancements and work with the Chipmunk disk drive — albeit each in its own way. Nevertheless, my congruent recommendation on the 64K RAM expansion module goes to the well-made product by PG Design. □

Please help us rate this article's value. If you've found it very valuable, circle 173 on the reader service card. If it was moderately valuable, circle 174—and if it wasn't valuable to you, circle 175.

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UT	23:12:16
LA	42°50.6'N
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DYNO-MITE (from page 39)

percent loaded, the gearbox is 79.5 percent loaded and the maximum horsepower demand is 19.54 hp.

Not bad, for a \$399 computer. But it's just the beginning.

PLAYING WITH THE BIG BOYS

Dyno-Mite's reports appear on the Model 100 screen or on print outs that Nabla calls *dyno cards*. As Gulf's Slaughter explains, the reports are useful all by themselves.

But the data is even more useful when integrated with other information and run through heavy-duty number-crunching routines on mainframe computers. The Model 100's built-in modem makes it possible.

Nabla has written a number of mini-computer and mainframe well-analysis programs to help oil company engineers with common tasks such as choosing between rod pumping, submersible electric pumps or subsurface hydraulic pumps at a given well site. The programs give engineers a profile of equipment loading, power consumption and well-production potential.

For big companies, Nabla loads a Hewlett-Packard mainframe computer

onto a truck and drives right to the well site for analysis. But smaller companies access the programs via General Electric's Time-sharing computer network, accessible by modem.

Data may be uploaded to the G.E. system from MS-DOS systems, Apple computers or the Model 100.

TURNING OFF, TUNING IN

One of the most important parts of keeping a well running is knowing when to shut it down. Nabla's pump off controller uses the Model 100 to monitor motor speed. When power drops below a certain level, the well is shut down to save energy and wear-and-tear on rod pumping equipment.

The controller also gives early indication of equipment failures and leaks, allowing engineers to service pumps *before* costly breakdowns are noticeable.

The Model 100 is also a vital part of Nabla's continuing education services for on-site engineers. Conducted by well analysts, the seminars cover topics like rod-pumping systems, computer analysis of rod-pumped wells and pump-off control technology.

FINDING LIMITS

Founded in 1971, Nabla claims to be the world's leading supplier of well analysis services, hardware and software. Dyno-Mite buyers include Marathon Oil, Tenneco, Gulf, Yates Petroleum, Amoco, Chevron, Atlantic Richfield and Champlin Oil, as well as a number of engineering firms providing services to oil companies.

The inverted delta shape is the symbol mathematicians use to describe the operation defining the gradient vector, which is useful in finding the maximum value of a mathematical relationship as it approaches an absolute limit. The shape is called *nabla*, after an ancient Assyrian harp.

Nabla Corp.'s founders chose the inverted triangle as a company symbol because it parallels their own aims: to help customers maximize profits while adhering to the bounds of good business practices.

Without adopting it as an explicit goal, they've lived up to their name in another way. Their creative use of the Model 100 in a highly technical environment pushes it to the limit of practical, real-world power.

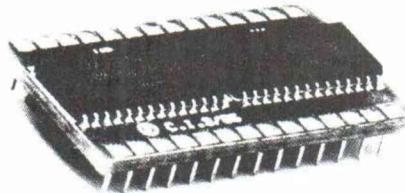
— J.D. Hildebrand

24K Expansion RAM

For the Model 200

\$150. each

\$275. for two

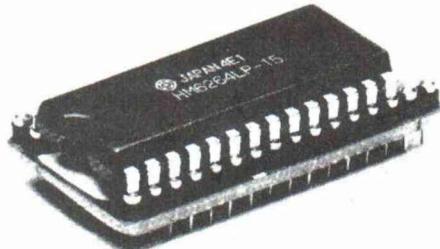


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For the Model 100 & 8201

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learned from Tandy's mistakes and didn't stand in the way when an IBM PC cottage industry began to form.

These were right moves and the industry continued to prosper. The PC was nothing startling using existing technology and Microsoft DOS. They even anointed the bestselling Epson MX-80 with an IBM sticker.

IBM expanded the use of microcomputers into offices faster than Tandy or Apple could have. They did a helluva job there. After all, they'd been servicing the computing needs of business years before Tandy and Apple. But then IBM got greedy and developed the PCjr and learned how out of place wingtips are at the beach.

LEGITIMACY 1.1

Of course the hype over the IBM Peanut was from the press, the non-computer press again. But I don't for a minute believe that those rumors didn't originate from IBM itself. The rumor spreading of "unannounced product" under development is an old ploy, one attributed to IBM in the mainframe and mini business as well.

Retailers began to wait for IBM to bring out its Peanut because the press

said IBM would "legitimize" the home computer market. People caught up in the excitement put off purchasing a home computer because, "Well Hell, Martha. Who'd have thought we could own an IBM?" The rest is history. The PCjr was an overpriced undercapable piece of junk leaving potential home computer buyers disillusioned and retailers discouraged. And the microcomputer boom in the home market disappeared into VCR sales.

LEGITIMACY 1.3

IBM has indeed profited from microcomputers. The nature of my complaint is that while the company has profited grandly, it has contributed nothing. What has IBM given the microcomputer marketplace other than high prices, such as word processors for \$200+, database managers for \$400 and spreadsheets for \$500? There's no TRS-80 Model I or Apple II to Big Blue's credit. Nor is there a Model 100 on its ledger sheet.

I've read, in the computer press as well as the outside world's, that the briefcase computer market won't exist until IBM "legitimizes" it with its own version. God help us all.

YESTERYEAR

When I get lonesome for the past and reach for my Portable 100's on the bookshelf, I spend little time thumbing through the pages. Instead I often find myself staring at the masthead — the people I worked with.

Jim Povec and I first saw the TRS-80 Model 100 in Ed Juge's office at Tandy Corp. in Fort Worth, Texas. By the time our plane touched down in Maine, we had the idea that became Portable 100.

There are thousands of stories connected to that thin masthead strip. A cast of characters. Each one of those people took that original idea and made it his or her own.

Nancy Laite is on the first issue masthead as typist. Now she is the managing editor. Bonnie Hellevig was office manager. Now she is in charge of special projects. Carl Cramer was director of marketing. Now he's associate publisher. And John Mello, who made this magazine his life, now spells his name J.D. Hildebrand. I have only one thing to say to these people: I still don't like the new logo.

My 24 hours are up.

—Kerry Leichtman

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—PC 8200 User Monthly

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How to Get Your Hands on an ADC

Featured in this equipment table are analog-to-digital converters (ADC) models suitable for use with Tandy portables, NEC PC-8201A and other laptops. Some are inexpensive, others are higher-priced units well-suited for critical industrial control or research data acquisition tasks. This list is not all-inclusive.

Generally it's safe to say that each unit's capabilities are reflected by its cost. The important consideration for the user is to match the equipment to his requirements.

For example, someone analyzing speech patterns may need digitizing at speeds in excess of 30,000 times a second. But someone measuring plant growth in an agricultural research center may require only one reading a day.

If a voltage is to be read to indicate when a battery is fully charged, eight-bit resolution (1 in 256) may be all that's required. However, controlling the temperature of a chemical process might require 12-bit resolution (1 in 4096).

The more complete ADC systems offer not only analog inputs, but also digital inputs (switch opening or closure), controlled outputs (to turn on other devices) and sometimes a line-carrier remote control device such as those compatible with the familiar BSR X-10 series of AC remote control modules (see *Remote Control*, pg. 43).

Some ADCs contain microprocessors, and random-access memory (RAM) for readings storage for later use by the computer, and some are programmable as stand-alone devices and don't require supervision by a computer.

Connecticut Microcomputer Inc.
(203) 354-9395
Model BUSSter D16R

Features 16 analog inputs of eight-bit resolution, and 100-byte buffer for storing readings. D/A sampling rate 100/sec. RS-232 or IEEE-488 available. Cost \$495 for model described. Devices also available for digital input/output (I/O), and analog outputs, \$495 to \$695.

Circle No. 101

Remote Measurement Systems Inc.
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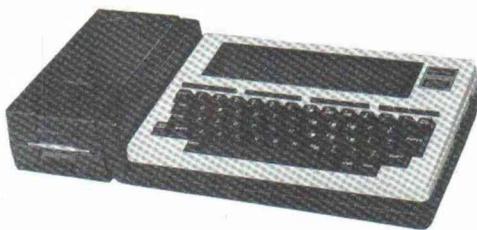
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*Immediately available for the TRS-80 Model 100 (portable must have 32K bytes RAM) and the NEC8201 and OLIVETTI OM-10 pending FCC approval.

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REAL WORLD

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Circle No. 102

Elexor Associates
(201) 299-1615
Model PL-1000 Measurement & Control System

Features 16 analog inputs of 12-bit resolution plus sign, 16 digital inputs, 16 digital outputs. CMOS for low-power use. Stand-alone operation possible with built-in BASIC interpreter and eight kilobyte (K) RAM. Unit can accommodate up to two I/O boards (optional) for additional channels. RS-232. Price \$899 basic system. Expansion boards \$329 to \$499. Many system options.

Circle No. 103

Quasitronics
(800) 245-4192
Model Q-304 Remote Data Collection System

Features two single-ended analog inputs, four digital outputs. A/D resolution one in 5000 or one in 20000 using BCD digits, sample rate is 7.5/seconds. RS-232. Price \$495.

Circle No. 104

Data World Products
(603) 588-3746
Sensatrol

Easy command structure in ASCII. Uses RS-232. Allows multiple analog inputs and discrete outputs. Uses AC outlet, but can be modified for battery power. (See review this issue.)

Circle No. 105

Software Science
(513) 561-2060
Model MTM1

Features eight analog inputs of eight-bit resolution, 12 digital outputs. RS-232. D/A sampling speed dependent on bps rate, up to 480/sec. Cost \$249 circuit

board, \$89 power supply, \$129 enclosure.

Circle No. 106

Starbuck Data Company
(617) 237-7695
Model 12232 Data Acquisition & Control

Features Microprocessor controlled, eight analog inputs of 12-bit resolution, eight digital inputs, eight digital outputs. RAM to store 2000 data points of burst data. Price \$690. Analog eight-bit 8032 version, \$390.

Circle No. 107

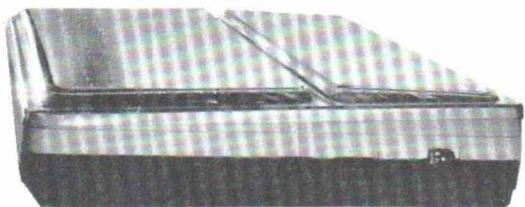
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—J.H.

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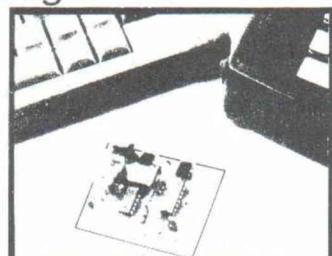
NEW Now, the TouchBase Modem comes with Auto Dial and Auto Log On software !!

TouchBase Design is proud to announce production of the TouchBase Modem—the only internal, direct connect modem designed for installation inside the NEC-8201A portable computer.

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Installation is easy: by using the supplied instructions and a small screwdriver, the TouchBase Modem can be installed in about 10 minutes. Because of the friendly design, there is absolutely no soldering necessary.

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By ALAN L. ZEICHICK

LetterWriter hardware adds new functions to Epson FX-80 and FX-100 printers: near-letter quality (NLQ) printing, software selection of Apple Imagewriter and IBM PC graphics, and enhanced option selection.

Installation of LetterWriter is easy and well-documented. The kit consists of three read-only memory (ROM) chips and step-by-step directions. The process is straightforward. Modifying a FX-80 printer took approximately fifteen minutes.

1. Remove the FX-80 or FX-100 cover. The seven-page installation guide shows the location of the cover screws and offers advice to prevent users from damaging the printer.

2. Remove the small circuit board, called the Sumi board. Not all production units of the FX series have this extra board.

3. Remove three Epson chips from sockets 4A, 4B and 5A. Some older FX-80 printers only have two chips, with the 4A socket left unoccupied.

4. Install the three LetterWriter chips into the same sockets. The chips are clearly marked 4A, 4B and 5A.

5. Cut jumper J1. There are five variations on the FX circuit board. Some units don't have this jumper but use either a resistor or a straight wire. The installation directions include photographs for all variations.

6. Move a shorting block from jumper J7 to J6. This only applies to certain production units.

7. Reattach the Sumi board and put the FX case back together.

Note that proper installation of LetterWriter does not void the printer's Epson warranty.

AMERICAN TYPEWRITER

The NLQ print font is American Typewriter 10. Printing NLQ takes two half-speed passes, with an overall print speed of 32 characters per second (cps). Regu-

lar draft speed on the FX-80 is 160 cps.

NLQ can be selected from the printer's console (Master Select) or through escape sequences. In BASIC, to select NLQ type, this would appear as:

10 LPRINT CHR\$(27);"x1"

and to return to standard pica draft, the following would show up:

20 LPRINT CHR\$(27);"x0"

There is no Elite (12 cpi) or Compressed (17 cpi) NLQ font. These commands use the standard FX type style.

Superscript (Esc-S1), Subscript (Esc-S0), Emphasized (Esc-E) and Double-Strike (Esc-G) work with NLQ. The double-strike mode actually produces (very slowly) a quad-strike image.

THE FX-80's default type style reads like this in draft mode, has this appearance in double-strike, and is just like this when emphasized. There's double-strike enhanced, too!

THE FX-80's new NLQ type style reads like this in draft mode, has this appearance in double-strike, and is just like this when emphasized. There's double-strike enhanced, too!

An adhesive quick-reference label is provided with LetterWriter, and this attaches to the top or front of the printer.

The escape sequence for Master Select (Esc-I) accesses the printer's regular Master Select features. Therefore, programs designed to take advantage of the FX-series printers' special capabilities will run correctly with LetterWriter installed.

A GREAT DEAL

Even with LetterWriter chips, the FX-80 and FX-100 printers are still inexpensive. The NLQ output from LetterWriter and the FX-series isn't as good as an impact printer, and isn't much faster. But the ability to switch between high-speed draft text, near-letter quality writing and dot-addressable graphics makes the FX-80 ideal for those who only want to buy one printer. □



The Tandy 200 is being driven by Pontiac district managers across the country.

Pontiac Puts the 200 on the Road

Even full-time staffers and three students keep track of 375 Pontiac sales and service managers scattered throughout the country, says Joe Thompson, the company's manager of sales communications. "We're tying our department together with electronic communications," he explains, referring to Pontiac's recent decision to purchase 400 Tandy 200s.

The department's entry into high-tech communications began with a pilot project using Model 100s in the fall of 1984.

"The folks from Fort Worth came up and paid a little visit," recalls Thompson. Pontiac purchased Model 100s for use by district managers in Jacksonville, Florida and Denver, Colorado. Assistant manager Dean Smale later traveled to Fort Worth to evaluate a prototype of the Tandy 200.

"We made our decision right then to purchase 200s," Thompson says. "For the money, the 200 is a much nicer machine... and it's cost effective."

Pontiac looked at many laptops before choosing the 200. According to Thompson, the company picked the 200 for its portability and reliability — but above all for the accessibility of stores and service centers for problem-solving and support.

"The Radio Shack people are more than willing to help," says Thompson, and that willingness means machines don't have to be packed up and mailed off for a week or more whenever a problem or malfunction arises.

Thompson sees many uses for the 200 by Pontiac's district managers. "They can send E-mail, access sales reports, retrieve customer warranty histories, make production status inquiries, locate cars and do service bulletin searches.

"(The 200) also can be an aid to the less experienced mechanic. If an '84 STE Pontiac has a rear-end noise, the service manager can tell the problem to the computer and get all the information relating to that problem."

The trial project's one-and-a-half-day training program left users — most of whom are new to computers, Thompson says — hungry for more. Trainees now receive three days of instruction.

Each session draws on a manual put together by Pontiac and excerpts from the Tandy 200 owner's manual. Applications walk-throughs also are included.

The Tandy 200 project probably won't end with district managers. Thompson anticipates purchasing a 200 for each dealership. As of this writing, Pontiac sales districts in Newark, New Jersey, Kansas City, Missouri and Boston, Massachusetts have their 200s up to speed. The company is distributing the laptops and training staff one district at a time from now until mid-March 1986. □

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EASYLINK (from page 17)

To check your mailbox, follow the same procedure (using WUM) up to where the screen shows PTS. At this point, press F2 (Down). Type *RECV* as the file name and press Enter. When the reverse video clears, any incoming message or the message *Your mailbox is now empty* will be stored in the *RECV* file. Press F8, Y and Enter. The message can now be reviewed by entering the *RECV* file.

It's advisable to make daily mailbox checks. If there aren't any messages, you'll receive the response *Your mailbox is empty*. An extra line shows the date and time the box was checked.

By using the local access number, there's no connect charge for checking your mailbox. A different address isn't needed for auto dial. Following these address formats should eliminate any need for trial and error:

WUAM:6593583<=?D00 ESLaaaaaaaa
uuuuuu.ppppp^M?S=/MBX>:

WUAS:6593583<=?D00 ESLaaaaaaaa
uuuuuu.ppppp^M>:

Here are suggestions regarding necessary hardware. All listed equipment is available through Radio Shack.

In addition to the Modem Cable Assembly (part number 26-1410), purchase the Dual Jack Plug (part number 279-363). This plug has a male modular plug on one end to go into the telephone wall outlet and dual jacks on the other. One of these is used for the telephone connection. The other is for the Model 100 cable. This connection allows the phone to be operational all the time. Many motels and hotels require dialing eight or nine to reach long distance. This wasn't put in the automatic protocol since some motels require going through their operator to dial an 800-number. Either way, follow the above steps up to the point where you're ready to press F2. As soon as you hear the dial tone, the rest is automatic.

Easylink gives access to all of Western Union's services: TWX, TELEX, cablegrams, mailgrams and E-Com. It also connects the 100 to a news service and a two-hour express document service. A Western Union salesman will arrange an account name and password a few days after signing the contract. □

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STILL HUNGRY?



LISTINGS, HERE! HEY, GET YOUR LISTINGS!

Spicy programs pepper the world of Tandy portable users . . . more than can be included in the pages of Portable 100/200 magazine. The magazine will continue to include listings—and for those with heightened cravings, the Editors are pleased to offer a monthly supplement of rich desserts.

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Bon Appétit

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But the story doesn't end there—we back both machines with extensive accessories that help make them powerful desktop tools.

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Turn your Tandy 200 or Model 100 into a versatile disk-based home or office system with a Disk/Video Interface—now only \$499 (26-3806, was \$799.00 in Cat. RSC-14). It features a built-in 184K floppy disk drive, and a 40-character by 25-line display with your TV or an 80 x 25 display with a standard video monitor. You can even add a second internal disk drive.

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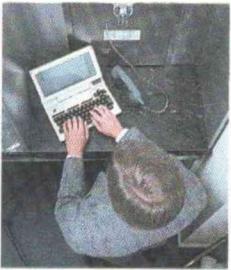
Our Bar Code Reader (26-1183, \$99.95) is an optical scanning device that's ideal for inventory control, billing and couponing. Software drivers, callable from BASIC, allow you to read Universal Product Code, 3 of 9, Plessey and other bar code formats.



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NEC ON A QUEST

When Electronic Systems Technology (EST) of Kennewick, Washington needed a portable computer to test with Esteem, its prototype wireless modem, it haphazardly chose the NEC PC-8201A. "It was there . . . and it worked," says EST's public relations manager, Michael Gaylin.

According to Gaylin, NEC approached EST with a proposal and an agreement was reached. But EST doesn't rule out doing business with other laptop manufacturers. "We're open to other original equipment manufacturers (OEMs) and special orders," he says.

The portable computer-Esteem connection is a simple one, Gaylin says, requiring only a serial port-to-modem cable and four screws to attach the two machines.

Testing and modification of the Quest prototypes continues. The modem itself received Federal Communications Commission (FCC) approval and went into production in early July. At press time, approximately 300 had been ordered.

Most units are being purchased for industrial control, Gaylin says, for applications such as manufacturing, warehousing, stock inventory, metering and

pump station control. A smaller percentage of modems has been bought for business networking where cable installation is too costly.

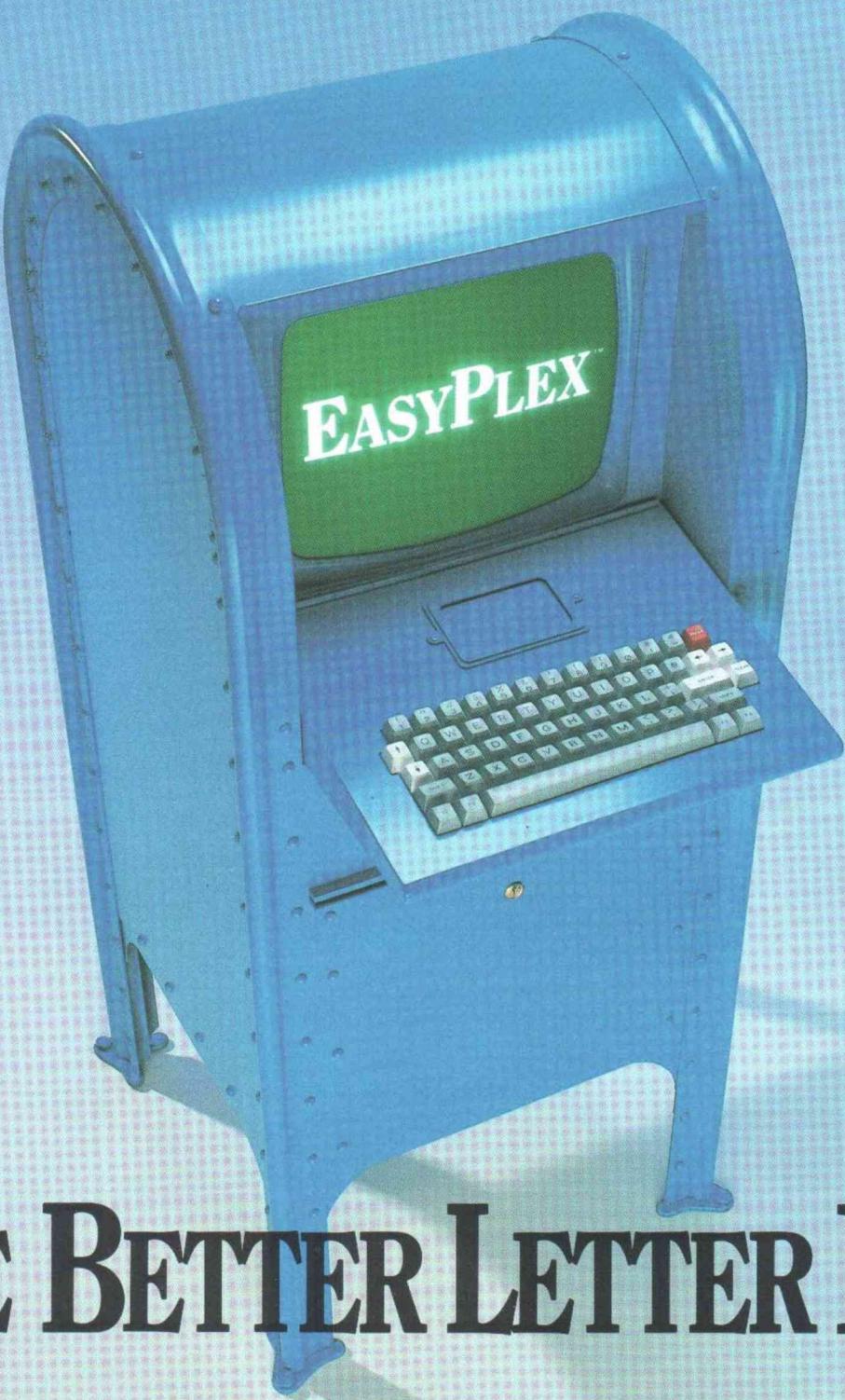
Gaylin also cites one southern California public school district that purchased several of the cable-free modems. They'll be used at a two-building school divided by a road. The modem cost less than installing cable between the buildings.

"The companies are buying in small numbers," says Gaylin. "They're talking about buying hundreds if they work out . . . One computer company with other

(continued on page 67)



Electronic Systems Technology's Quest is an OEM. The NEC-Esteem combination creates a wireless modem — the first in portable data communications systems.



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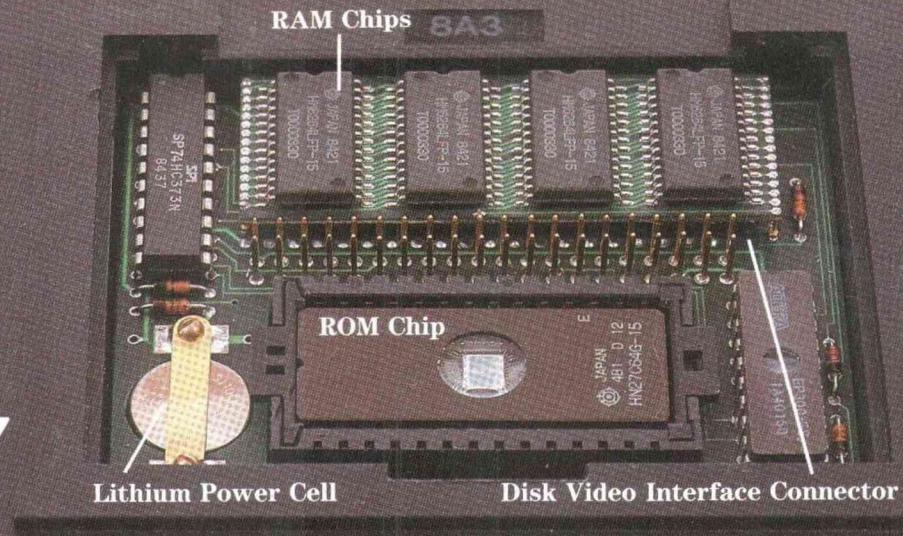
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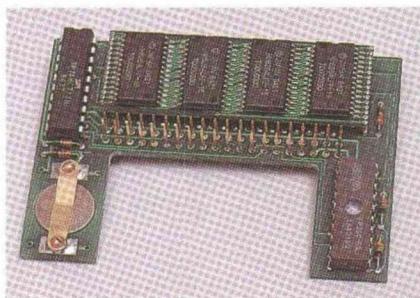


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